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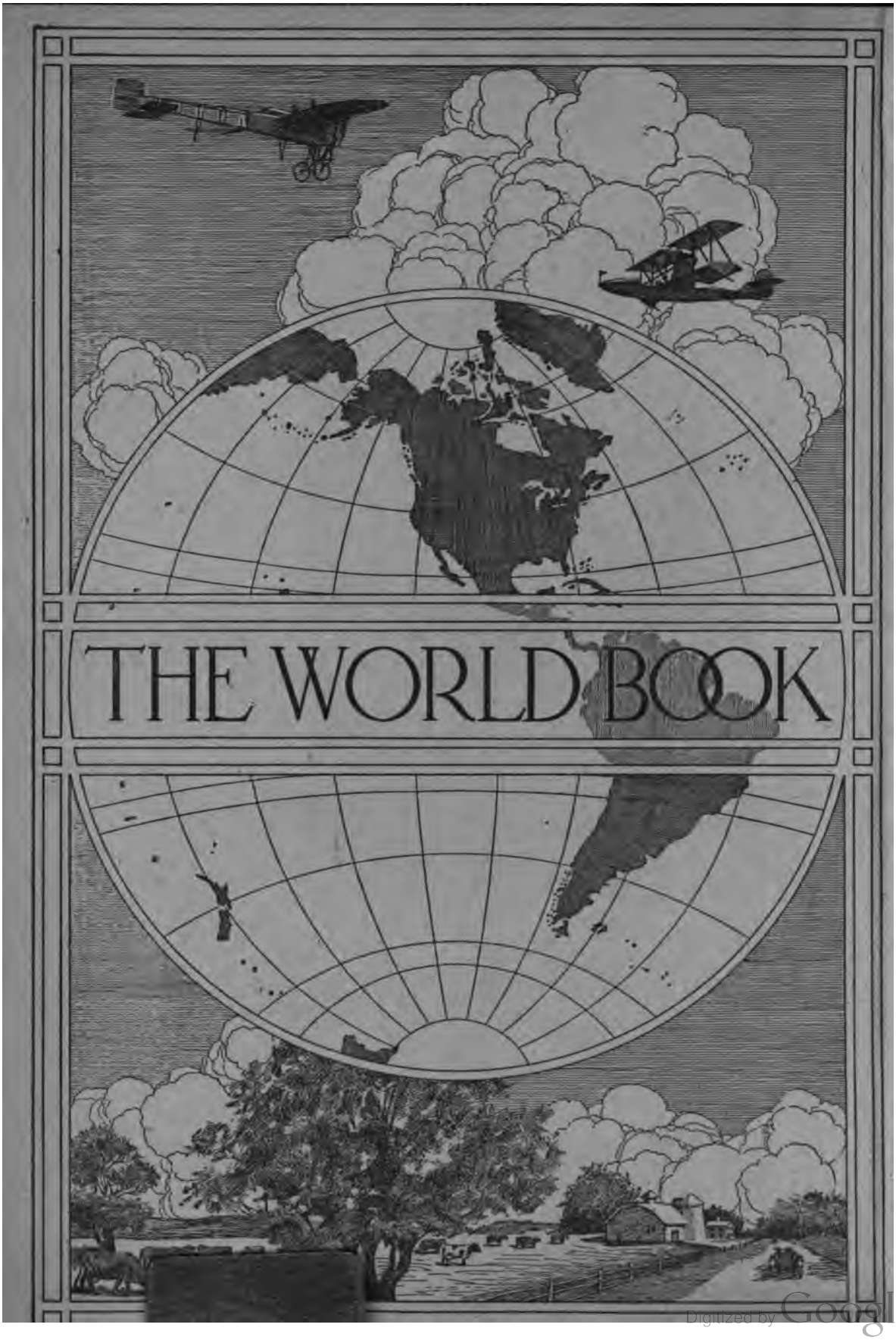

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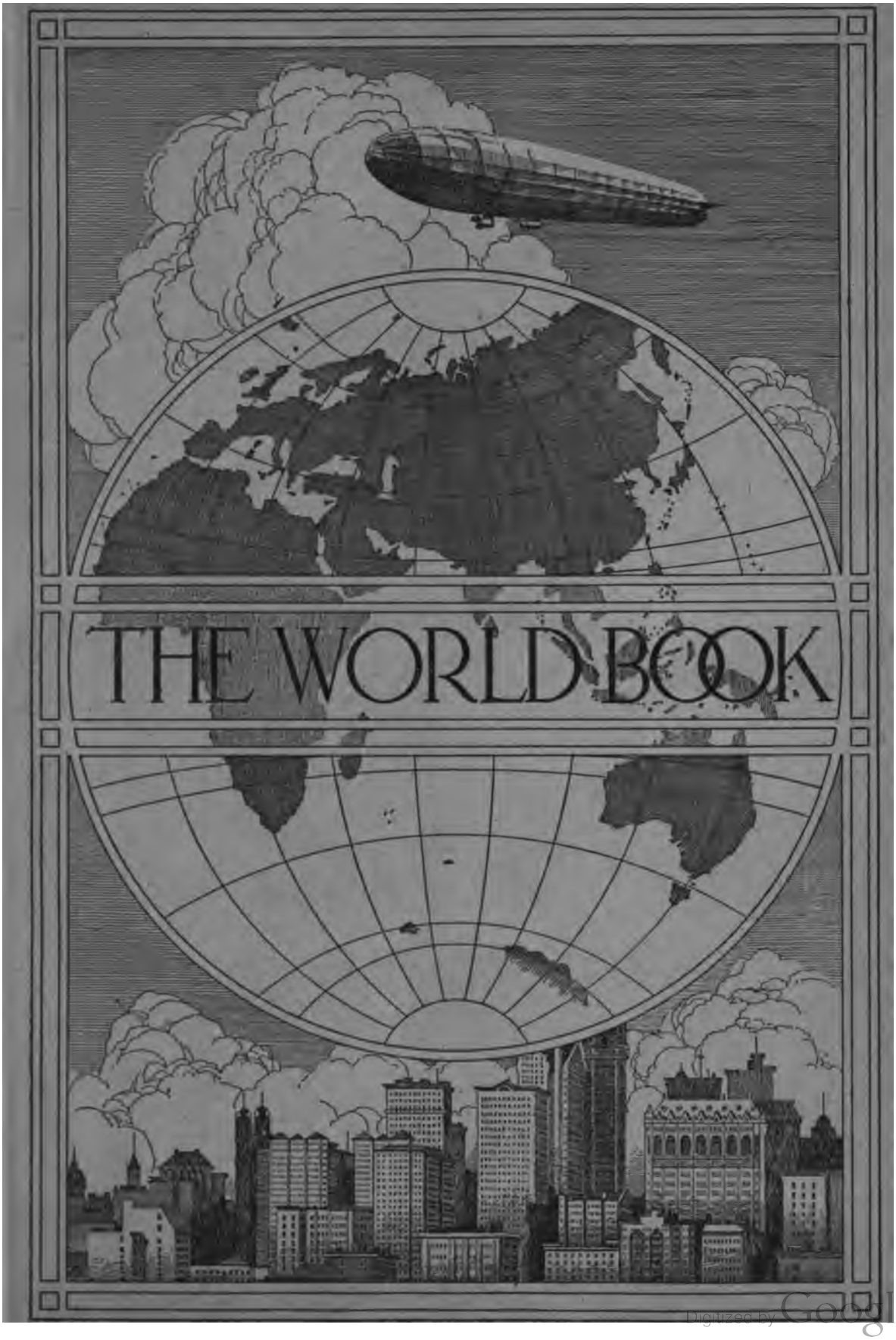

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LEMBERG, *lem'berK,* a city of Austria-Hungary, and capital of the crownland of Galicia, is situated on the River Peltew, 365 miles northeast of Vienna. It is fourth in population among the cities of Austria, being exceeded only by Vienna, Prague and Trieste. The place is defended by a citadel, around which the modern town has grown up; most of the prominent buildings are found in the suburban districts. There are many imposing Greek and Roman Catholic cathedrals, and the city also possesses the third largest university in Austria. In the Ossolinski National Institute are valuable collections of Polish historical and literary relics, besides a library of over 180,000 volumes. There are manufactures of farm machinery, boilers, musical instruments, candles, flour and other commodities, and in time of peace the city enjoys a considerable trade in agricultural products.

Lemberg was founded in the thirteenth century, and has had a varied history, having suffered many times from siege and bombardment. Early in the War of the Nations (which see) the Russians began an offensive movement in Galicia, resulting in the capture of Lemberg, which they held until June, 1915. Its recapture by the Austro-German forces, during the spectacular drive against Warsaw, meant the loss of an important base of supplies for the left wing of the Russian army. Population, 1914, 212,000.

LEMIEUX, *le mye',* RODOLPHE (1866-), a Canadian statesman, one of the leading members of the Liberal party, and author of the Lemieux Act of 1907, which was aimed to help in the elimination of strikes and lockouts by providing government conciliation. Lemieux was born at Montreal, Que., attended Laval University, and was called to the bar in 1891. He was elected to the House of Commons as a Liberal in 1896, and has served since without interruption. He entered the Laurier Ministry in 1904 as Solicitor-General, was Postmaster-General from 1906 to 1911 and during four months in 1911 was Minister of Marine and Fisheries. Lemieux was successful on several difficult diplomatic missions, notably one to Japan in 1907, when he succeeded in inducing the Japanese government to restrict emigration to Canada. He also maintained his standing at the bar, was professor of the history of law at Laval University, and is the author of several volumes on legal subjects.

LEMMING, *lem'ing,* a small animal related to the field mouse, of a clumsy form, large head and short, thick legs. Its length is about six inches, of which nearly an inch is included in the little, stubby tail. Lemmings live in shallow burrows dug in the dry parts of swampy ground, under stones or in the peaty soil. The European lemming is the best-known species; other varieties are found in the northern parts of both hemispheres. The lemming sits very quietly near its burrow most of the day, and is active during the night. If molested it sets up a loud squeaking and grunting, much like a guinea pig. If cornered, it bites viciously, springing at the intruder with short leaps.

THE LEMMING

The lemming lives on buds of the dwarf birch, roots, grass and reindeer-moss. In the winter it lives on what it can find under the snow. Like other fur-bearing animals which live in cold countries, it turns white in winter. In Europe it migrates occasionally in immense troops, often numbering hundreds of thousands, devouring every green thing in its course and doing as much damage as the migratory locust. It advances stubbornly in one direction, crossing mountains, swimming rivers and permitting nothing but an impenetrable barrier to alter its course. Thousands die from hunger, disease, fatigue and accidents, and many are killed by beasts and birds of prey that follow them. They move steadily on until they reach

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their destination; if, however, a large body of water appears before them they plunge in and meet death by drowning.

LE MOINE, *le moyn',* or *le mwhaN',* SIR JAMES MACPHERSON (1825-1916), a Canadian historian and naturalist, who wrote with equal facility in French and English. He was born at Quebec, was educated there at Le Petit Séminaire, and was called to the bar in 1850. For a number of years he was collector, and then inspector, of inland revenue at Quebec, but later he devoted himself to literary work. He gave much of his time to the study of natural history, especially birds, and his *Birds of Quebec* and *L'Ornithologie du Canada* are among his most popular writings. In addition to ornithology Sir James became a specialist in archaeology and history, subjects in which he was noted for carefulness in investigation and impartiality in his conclusions. Among his many books are *Legendary Lore of the Saint Lawrence; The Fisheries of Canada; Quebec, Past and Present; Canadian Heroines,* and *Annals of the Port of Quebec.*

LEMON, *lem'un,* the fruit of a tree of the citrus group, whose thick outer rind is the source of a valuable oil, and in whose pulp is found the acid juice used everywhere in making the popular beverage known as lemonade and as a flavor in cookery. The lemon tree, which belongs to the same group as the orange and the lime, grows wild in India, and is supposed to have been introduced into Europe during the Crusades, about the year 1200. It is now cultivated in Italy and the neighboring islands, in Spain and Portugal, in Mexico and in the warm states of California and Florida. It grows from ten to twenty feet in height, bearing long, willowy branches which are meagerly clothed with pale-green leaves. The flowers, which are small and marked on the outside with purplish lines, are fragrant, but less so than their cousins, the orange blossoms.

The lemon tree begins to bear the third or fourth year and comes into full bearing the sixth or seventh year. The average yield for one tree is between 200 and 300 pounds a year, this figure varying with the care given and the weather conditions. Trees are usually planted one hundred to the acre, so a grower expects an annual yield of from 2,000 to 3,000 pounds per acre. In Northern California lemon groves in full bearing have a value of from $750 to $1,500 per acre, and in Southern California the price ranges from $1,000 to $2,500. The life of the lemon tree averages about forty years.

The fruit of the lemon tree is classed by botanists as a berry. It is shaped like an egg, and its light-yellow outer rind has a rough appearance, which is due to the numerous oil glands imbedded in its surface. On the inside of the peel is a white, spongy, almost tasteless inner rind, while the whole interior of the fruit is filled with a juicy, sour, light-colored pulp. This is divided into ten or twelve sections, each of which contains two or three seeds.

THE LEMON
(*a*) Cross section of fruit
(*b*) Flower
(*c*) Stamens and pistil
(*d*) Whole fruit
Above is a branch showing arrangement of leaves.

Since lemons do not keep well if allowed to ripen on the tree, they are gathered while still green and placed upon trays in cool, dark rooms. As the fruit slowly ripens, its rind becomes tougher, thinner and more pliable, conditions which promise good keeping qualities during the process of shipping. On their removal from the curing rooms the lemons are sorted, graded, wrapped in tissue paper and packed in boxes.

Lemon extract, or oil, which is widely used for flavoring and as a basis for perfumes, is obtained by pressing the oil from the peel. The juice of the pulp, whose tart, agreeable flavor is due chiefly to the citric acid contained in it, has several uses. Cold lemonade is one of the most refreshing of summer beverages,

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and hot lemonade is highly valued for breaking up a cold. Lemon juice will restore the color to cloth discolored by alkali stains; its efficacy in removing such spots from the hands is well known. Medicinally, it has mildly laxative qualities. Calico printers use it to produce greater clearness in the white part of patterns dyed with colors containing iron, and it is also an important source of commercial citric acid (which see).

The Industry in America. From two great fruit-bearing states, California and Florida, is obtained practically the entire lemon crop of the United States, which amounts annually to about 2,770,000 boxes, valued at nearly $3,000,000. Of this output, California produces 99½ per cent, the yearly crop averaging 2,756,000 boxes, or 5,000 carloads, valued at about $2,976,500. Each year there are imported into the United States and Canada over 150,000,000 pounds of the fruit, having a value of over $6,000,000. Nearly all importations are from Italy, of which the United States is becoming a keen competitor. B.M.W.

LEMUR, *lee'mur,* an animal allied to the monkey, native to Madagascar, though also found in Africa, India and the Comoro Islands. The lemur is lower in the zoölogical scale than the ape and the monkey, its brain being simpler

THE LEMUR

in structure. It is a pretty little animal, about the size of a cat, with soft fur and long, bushy tail. The head is round and the nose so long and pointed that it has been called the *fox-nosed monkey.* It lives in trees, eats fruits, insects, small birds, eggs, reptiles, etc. Of the fifty species the best known are the *ring-tailed,* which is gray in color with black and white rings around its tail; the *ruffled,* one of the largest of the species; the *mouse lemur,* which is about the size of a rat; the *indris,* which is black with white legs. The lemur is easily tamed and is very playful in captivity.

Lemur means *ghost,* a name given the little animal on account of its spectral appearance and its habit of feeding at night. Its howl resembles that of a dog, and for this reason the natives of Madagascar give it a name which means *dog of the forest.*

LE'NA, a river of Eastern Siberia, the main trade artery of a large district. It rises on the slopes of the Baikal Mountains, 186 miles northeast of Irkutsk. Its entire length is 2,700 miles, the whole of which lies in the Russian dominions. At Irkutsk it attains a width of six miles, then flows north to the Arctic Ocean, where it forms a delta 250 miles wide. The chief tributaries are the Vilim, Kirenga, Olekma, Aldan and Vilyui. There is little agricultural land along its upper course, and it becomes navigable at its junction with the Kuta River, about 430 miles from its source. Along its middle course the country is sparsely inhabited by Yakuts, a people who live by fishing.

It is claimed that the difference between the summer and winter temperature along the Lena is the greatest known. At Kirensk the river is frozen from October to April; at Yakutsk, from October until the last of May. Olekminsk, Vitimsk, Verkholensk, Bulun and Yakutsk are its principal ports. The commerce consists chiefly of minerals, grain and fish, which are carried in wooden barges built in the shipyards at its various ports. At the mouth of the Lena there is considerable ivory trade from tusks of prehistoric animals found in the new Siberian Islands. The victims of the *Jeannette,* a north-polar expedition vessel, are buried on an island in the delta. The river drains an area of about one million square miles, nearly equal to one-third the area of Canada.

LENNI-LENAPE, *len'i len'a pe.* See DELAWARE (Indians).

LENOX, *len'uks,* JAMES (1800-1880), the founder of Lenox Library and a benefactor of many charities, was born in New York City. He was graduated from Columbia College and for forty years devoted himself to the collection of rare books and works of art. His gifts to the Presbyterian Hospital, the Philipps Memorial Church, the Presbyterian Home for Aged Women and to the Lenox Library amounted to over $2,000,000.

LENS, *lenz,* a transparent substance, having at least one curved surface. Lenses thickest in the middle are convex; those thickest at the edges are concave. The six kinds of lenses are shown in the figure on page 3380, and there is explanation of their forms.

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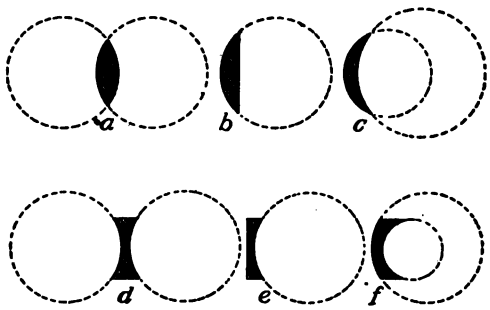
When a ray of light passes through a lens it is bent towards the thickest part. Accordingly, light rays passed through a convex lens



LENSES

The six forms of lenses. The first three are *converging* lenses, thicker in the middle than at the edges; the lower three are *diverging*, thinner at the middle than at the edges:
(*a*) Double-convex—both surfaces convex.
(*b*) Plano-convex—one surface convex, one plane.
(*c*) Concavo-convex—one surface convex, one concave.
(*d*) Double-concave—both surfaces concave.
(*e*) Plano-concave—one surface concave, one plane.
(*f*) Convexo-concave—one surface concave, one convex.

tend to meet in a point, or *focus*. Parallel rays such as a, b, c, d (Fig. 2), passing through the double-convex lens *X Y*, converge at *M*, the *principal focus*. A familiar illustration is fur-

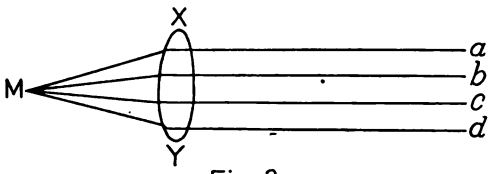


Fig. 2

nished by the burning-glass (which see), which brings the sun's rays to a point, so concentrating their heat as to ignite inflammable substances.

Images produced by convex lenses are of two sorts—*real* and *virtual*. A ray passed through the optical center (Fig. 3) of a lens is not refracted. Such rays are called *axial*. The principal axis *L N* passes through both the

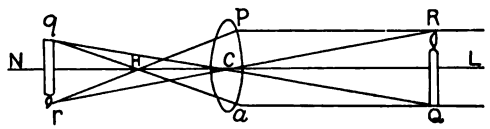


Fig. 3

optical center and the principal focus *H*. All rays parallel to the principal axis are so bent as to pass through *H*. Where *R P* crosses the axial ray at *R*, the image at *r* is found. Similarly *Q* is found at *q*. The resulting image is inverted and *real*. It is smaller or larger than the object, according as the object is at a distance greater or less than twice the focal length *C H*.

When the object is within the focal distance *G L* (Fig. 4), the image appears on the same side as the object, erect and magnified. Such an image is called *virtual*.

The parallel rays from *N* and *R* are bent, and meet at the focal point *G*. The rays *L N* and *L R*, being axial, are not refracted. The image *N R* appears where the axial rays meet

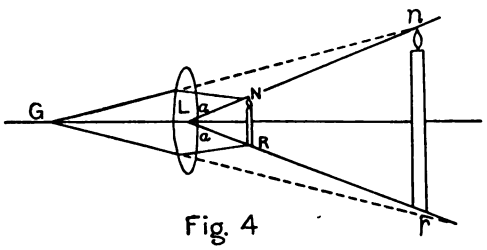


Fig. 4

the refracted parallel rays, which is on the same side as the object. The illustration shows the use of the double-convex lens as a magnifying glass. Images formed by concave lenses are erect, virtual and smaller than the object. Thus the reducing glass is exactly the opposite of the magnifying glass, being double-concave instead of double-convex.

Related Subjects. The following articles in these volumes will be of interest in connection with a study of light:

Aberration	Polarization of Light
Camera	Physics
Diffraction	Reflection
Ether	Refraction
Fluorescence	Spectroscope
Light	Spectrum Analysis
Microscope	Telescope
Mirror	

LENT, from the old English word *lenten,* meaning *spring,* is the season of fasting which begins with Ash Wednesday, forty days before Easter, and ends with Easter Sunday. It is observed by the Roman Catholic, the Eastern and the Anglican churches. In modern times much latitude is allowed in the observance of Lent, the age, health and occupation of individuals being taken into account. See EASTER, for explanation of the above movable dates.

LEN'TIL, an ancient food plant, one of the first cultivated by man. It is said that the lentil found in Egypt was the pottage for which Esau gave his birthright. It belongs to the family of plants called legumes, which bear seeds in pods, like the pea and bean, and it has

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many varieties. It thrives best in light, dry soil, as rich soil yields few pods. The European countries bordering on the Mediterranean Sea and Egypt and Western Asia produce the greatest supply.

The seeds are the part used for food. They are white, brown or black, and are of various sizes, never growing larger than half an inch in diameter. When cooked they are reddish in color. They have a pronounced flavor, are among the most nutritious of legumes, being rich in protein and carbohydrates, and are used for the most part in making soup. Excellent fodder for sheep, horses and cattle is provided by the vine. Lentils are not well known in the United States, the supply found in the markets being imported.

LENTIL, BRANCH AND SEED

LEO, the name of thirteen Popes. Of these, Leo XIII was one of the greatest occupants of the Papal chair. Several others won for themselves permanent places in history.

Leo I, known as Saint Leo, was Pope from 440 to 461. Even before his accession he was recognized as one of the foremost of the Church "fathers," and his election aroused general enthusiasm. He regarded himself as universal bishop, and attempted to use his strong position to put down a heresy which had gained considerable headway, but in vain. In secular history Leo I bears a dramatic part. When Attila I invaded Italy, Leo, commissioned by the Emperor Valentinian, went to meet him and induced him to spare the city of Rome. Later, when another raid threatened under Genseric, the Pope persuaded the Vandal chief to refrain from burning the city and putting the inhabitants to death.

Leo III, Pope from 795 to 816, is chiefly memorable as the pontiff who crowned Charlemagne and so assisted in founding the Empire of the West. His rule was much disturbed by various outbreaks, and in 799 he besought the protection of Charlemagne, who in the next year visited Rome. In return for the Pope's services, Charlemagne guaranteed his temporal sovereignty over the States of the Church, with the understanding that the emperor should retain a protectorate over them.

Leo IX, who reigned from 1048 to 1054, was a cousin of the emperor, Conrad II. A man of learning and of upright life, he strove to reform abuses in the Church, opposing simony, or traffic in sacred things, and insisting upon the celibacy of the clergy. He traveled in France, Italy and Germany, holding councils and laboring to strengthen the authority of the Papal office. In 1053 he was taken prisoner by the Normans in Southern Italy, and held in honorable captivity until a few weeks before his death.

Leo X was of the famous family of the Medici, a son of Lorenzo the Magnificent. He was born in Florence in 1475, made a cardinal at the age of thirteen, and after some years spent in travel and in study was chosen Pope in 1513. Before all else, Leo X was a scholar and a patron of learning. He chose scholars for high positions at his court, and made Rome the center of the artistic and literary world, as it had long been the center of the world's religion.

But his reign was by no means without political significance. In order to gain funds for the rebuilding of Saint Peter's, he permitted the preaching of indulgences, and this was one of the things which roused the active opposition of Martin Luther and led to the outbreak of the Reformation. Leo issued a bull against Luther in 1520, which the reformer burned, but it does not appear that the Pope ever viewed the Reformation seriously.

Leo XIII (1810-1903), had one of the longest reigns in the history of the Papacy, from 1878 to 1903, and proved himself a most active and enlightened pontiff. He was born at Carpineto, Italy, his name until his elevation to the Papal throne having been Gioacchino Vincenzo Raffaello Luigi Pecci. After studying in the Jesuit College at Viterbo and in Rome, in 1837 he was ordained a priest and named domestic prelate to Pope Gregory XVI. A noteworthy early achievement was his suppression of brigandage and smuggling in Benevento, while delegate to that duchy in 1838. Later he was delegate at Spoleto and at Perugia, and in 1843 was made archbishop of Damietta.

In 1846 he was consecrated archbishop of Perugia, and there he remained until 1878, having in the meantime (1853) been created

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cardinal. When Pope Pius IX died in 1878 he was elected his successor at the age of 68. His reign was a most notable one in the history of the Church. He restored the hierarchy to Scotland, established one in India and brought to a triumphant conclusion the religious struggle with Germany. A Holy Father of great

LEO XIII

moderation, he constantly urged Catholics in all parts of the world, notably in Canada and in Ireland, to refrain from opposition to their legitimate governments, but he never could bring himself to recognize the authority of the Italian government over Rome, to the last regarding himself as a prisoner in the Vatican. He was a scholar, the author of excellent Latin verse, and a patron of literature. G.W.M.

For a list of all the Popes, see the article POPE, in which is also a detailed account of the method of election to the Papal chair. Consult Milman's *History of Latin Christianity;* Mann's *Lives of the Popes in the Early Middle Ages;* Vaughan's *The Medici Popes;* Keller's *Life and Acts of Leo XIII.*

LEO, THE LION, the fifth zodiacal constellation, occupying the sign of Virgo. This is one of the oldest of constellations, and was described as a lion in the oldest known zodiac. The principal star in this constellation is Regulus, sometimes called *cor leonis,* or the *heart of the lion.* It is a star of the first order, or magnitude, the stars Beta and Gamma being of second magnitude. There are ninety-five stars in this constellation, which is also remarkable for its nebulae.

Leo is the fifth sign of the zodiac, between Virgo and Cancer, and is entered by the sun about July 22. The astronomical symbol is ♌, the origin of which is not quite clear, though it has been suggested that it represents either the breastbone or the tail of the lion. According to the Greeks Leo is the Nemean Lion which was slain by Hercules.

For illustrations, see STAR; ZODIAC. For explanation of magnitude, see STAR.

LEOMINSTER, *lem'in ster,* MASS., is situated in Worcester County, northeast of the geographical center of the state, on the Nashua River. It is noted for its extensive manufacture of celluloid and horn specialties, which exceeds that of any other city of the United States. Fitchburg is five miles north, Worcester is eighteen miles south, and Boston is forty-five miles southeast. The city is served by the Boston & Maine and the New York, New Haven & Hartford railways; electric lines connect with towns in all directions. Leominster was settled in 1725, and was a part of Lancaster until it was incorporated as a separate town in 1740; it was incorporated as a city in 1915, and was named for the English town Leominster. The population increased from 17,580 in 1910 to 20,839 (estimate) in 1916.

Leominster is not excelled by other cities of its size in the variety of its manufactures; among these combs take the lead. Locally it is known as the *comb town.* Celluloid and horn specialties, hairpins, buttons, jewelry, toys, shirts, baby carriages, pianos and furniture are other important manufactures. In addition to its public schools the city has a Carnegie library. Whalom Lake and Whalom Park are adjacent pleasure resorts.

LEON, *la ohn',* the largest city of Nicaragua and capital of the department, or province, of the same name, is situated about fifty miles northwest of Managua and thirteen miles from the Pacific Coast. Its cathedral and the College of San Roman, founded in 1678, for a long time one of the most celebrated institutions for learning in America, are among the finest structures in Central America. The city is connected by railway with the port of Corinto and is an important trading center. Population about 62,500.

LEÓN, or **LEÓN DE LOS ALDAMAS,** *la ohn' da lohs al dah' mahs,* a city of Mexico, prosperous in times of peace in the republic, is situated in the southern part, in the state of Guanajuato, at an elevation of 6,000 feet above sea level. It lies in a rich farming section and enjoys a thriving trade in wheat and other grains. The principal manufactures are leather, cottons,

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woolens, saddlery and gold and silver embroidery. The Mexican Central Railway serves the town. Population, 1910, 57,700.

LEONARDO DA VINCI. See VINCI, LEONARDO DA.

LEONIDAS, *le on' i das,* king of Sparta, successor to his brother Cleomenes I in 491 B.C. When the Persian monarch Xerxes approached the Grecian states with an immense army Leonidas opposed him at the narrow pass of Thermopylae with a force of several thousand, including 300 Spartans, 700 Thespians and 400 Thebans. For two days the heroic little band resisted the attacks of the great Persian army, showing the most wonderful courage. On the third day of the conflict, through the treachery of a Greek named Ephialtes, who betrayed to the Persians a mountain path, Leonidas and his little army were assailed from the rear, and before the sun went down not one remained of the Spartans and their heroic Thespian and Theban allies. The other allies had been allowed to withdraw when the danger became evident. See THERMOPYLAE.

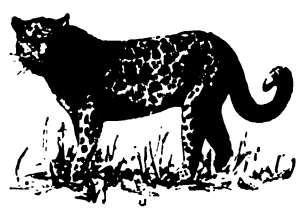
In later years pillars were set up to commemorate the bravery of the Greeks, who were buried where they fell. One tablet bore the words:

"Four times a thousand men from Pelops' land
Three thousand times a thousand did withstand."

Over the Spartans stood another column with these words:

"Go tell the Spartans, thou that passeth by,
That here, obedient to their laws, we lie."

LEOPARD, *lep' erd,* a fierce animal, the third in size of the cats of the Eastern Hemisphere, being excelled in dimensions only by the lion and the tiger. It is a graceful, alert and cunning animal, and in size and color is the most variable of all the large cats. The color is usually of a light tan, generously spotted, and the tail is ringed. The characteristic marking of these animals, "the unchanging leopard spots," makes their fur of great value. The black leopard is of so dark a hue as to make the spots almost imperceptible. Leopards feed on such mammals as monkeys, sheep, goats and dogs, and, like other great cats, they prey especially upon the latter. Seldom do they attack human beings, but once having discovered that people are easy victims, they may be more dangerous than the tiger or lion. These great cats frequent wooded districts, and are found throughout India, Persia, Ceylon, Arabia and Africa. See CHEETA.



THE LEOPARD

ENRAGED!

LE' OPOLD, the name of two kings of Belgium. They were father and son, but unlike in their conduct of the affairs of their kingdom and in their personal lives.

Leopold I [GEORGE CHRISTIAN FREDERIC] (1790-1865), a king of Belgium, the son of Francis, Duke of Saxe-Coburg, and uncle of Queen Victoria of England, was born at Laeken. He received an excellent education and later took an active part in Russian military affairs under the Emperor Alexander I. In 1816 Leopold married Princess Charlotte, daughter of King George IV of England; she died the next year. The throne of Greece was offered to him, but he refused it, and in 1831 he was elected king of the Belgians, who had revolted against Holland's rule. A year later he married Princess Louise, daughter of Louis Philippe of France. A son, Leopold II, succeeded him (see below). His wise and moderate rule laid the foundation for the later prosperity of the Belgian kingdom.

Leopold II [LOUIS PHILIPPE MARIE VICTOR] (1835-1909), became king of Belgium in 1865. He was the uncle of Albert I, who succeeded him in 1909. He organized the African International Association for the purpose of developing the natural resources of the Congo River region, financed Stanley's famous explorations in South Africa, and was given control of the Congo Free State in 1885, when it was taken over by Belgium. Affairs among the natives engaged in rubber and ivory industries there were conducted so disgracefully by him as to call forth severest criticism from other nations (see CONGO). Leopold was survived only by daughters, and as women are not permitted to wear the crown of Belgium, the nearest male heir succeeded to the kingship. See ALBERT I.

Consult MacDonnell's *King Leopold II;* Rappoport's *Leopold, King of the Belgians.*

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LEPIDOPTERA, *lep i dop' te ra,* from two Greek words, *lepis,* meaning *scale,* and *pteron,* meaning *wing,* is that order of insects which includes the butterflies and the moths. The name has reference to the fact that the wings are covered with tiny scales or flattened hairs. Members of this group pass through a slow series of changes, known as *metamorphosis,* before they reach their adult form. There are first the eggs, then caterpillars, which grow and shed their skins frequently, then the cocoon, and finally the moth or butterfly. See BUTTERFLY; INSECT; METAMORPHOSIS; MOTH.

Consult *List of North American Lepidoptera and Key to the Literature of This Order of Insects* in United States National Museum Bulletin 52 (Washington, D. C.).

LEP'IDUS, MARCUS AEMILIUS (? -13 B. C.), dictator of Rome during Julius Caesar's absence in Spain (49-48 B. C.), colleague of the latter in the consulate (46 B. C.), and appointed to the government of Nearer Spain by Caesar in 44 B. C. After the assassination of the great Roman leader, Lepidus supported Mark Antony and became one of the triumvirate with Octavius (later the Emperor Augustus) and Antony. His lack of statesmanship, weakness of character and want of military talents made him inferior in importance to the other two, who gave him Africa as his province. In 36 B. C. he made a desperate attempt to seize Sicily, but his soldiers deserted him and went over to his rival, Octavius. The latter permitted him to retain his wealth, but compelled him to live in retirement.

LEPROSY, *lep' ro si,* the most universally dreaded disease. Leprosy affects the skin and has numerous forms, classified in three groups; *macular,* in which the skin shows dark red or black stains; *anesthetic,* in which there is a loss of sensation in the patches of afflicted tissue; and *tubercular,* marked by areas of granulated tissue, that is, tissue covered with small, red grainlike elevations. Patients are sometimes afflicted with a form of leprosy combining the three varieties; in the two first named the nerves are slowly destroyed.

Leprosy is spread by contagion and is not hereditary. It probably enters the system through the passages of the nose and throat, and takes from two to seven years to develop. The spots attacked first show small white lumps, which later ulcerate. These ulcerations are usually on the exposed skin of the face and hands, but they sometimes attack other parts of the body. In deep ulceration the flesh and even the bones are destroyed.

IN THE LEPER COLONY ON CULION ISLAND

This enterprise is situated about 200 miles from Manila. At the left are pictured sanitary quarters of the victims; at the right, the lepers' theater and its attractive approach.

Lepers always have been shunned. In Biblical and medieval times they were forced to dress in an easily-identified costume and carry rattles or clappers to warn others of their approach. Until recently leprosy was supposed to be incurable. An antivenomous serum was successful in a few cases, but the best remedy for leprosy, chaulmooga oil, has been known for years by East Indians. The treatment must be kept up for a period of several years. Formerly the patient was so nauseated by the oil that he usually abandoned its use. This oil, however, has been used successfully in a number of cases by Dr. Victor G. Heiser, head of the United States leper colony on the island of Culion, in the Philippines. He overcomes its nauseating effects by mixing it with camphorated oil and resorcin; it is given hypodermically.

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The colony on Culion is the largest in the world, and has 8,000 lepers within its limits. Until the establishment of the colony these lepers were living unhygienically and mingling with healthy people. They are all from the Philippine Islands. Louisiana has a small hospital for lepers, and the colony at Molokai, Hawaii, cares for about 1,100 victims. The good these leper colonies are accomplishing in curing and controlling the disease is immeasurable, and it is possible that some day leprosy may be exterminated. See MOLOKAI.

Consult Blue's *The Public Health Aspects of Leprosy;* also *Studies upon Leprosy,* in *Public Health Bulletin* No. 61 (Washington, D. C.).

LESAGE, *le sazh',* ALAIN RENÉ (1688-1747), a French novelist and dramatist, whose most enduring work, *Gil Blas* (1715), was a forerunner of the realistic novel of later French literature. It was not only his finest literary achievement, but was a masterpiece of eighteenth-century fiction. *Gil Blas,* the story of a Spanish youth who lives down the indiscretions of his early days and develops a character worthy of admiration, has been aptly called "a gospel of a worldly-wise man's common sense." Lesage is also remembered for his novel *The Devil on Two Sticks* and the comedy *Turcaret.* The latter gives with cruel realism a picture of the narrowness and pettiness of Parisian life. He was one of the early masters of style, and his manner of writing is still praised for its ease, naturalness and pithiness.

LESCARBOT, *le skahr'bo',* MARC (about 1570-1630), a French explorer and colonist, whose accounts of his voyages form one of the most important sources of early Canadian history. In literary merit these records rank high, and Lescarbot has been styled "the French Hakluyt." Lescarbot was a lawyer by training, but in 1605 joined his friend Poutrincourt on an expedition to relieve Port Royal. He returned to France in 1607, and two years later issued his principal work, the *History of New France.* The title is misleading, for he covers not only New France, but narrates the voyages of Verazzano, gives the story of the settlement of Florida, Brazil and Acadia, and gives other details which are not now considered as a part of French-Canadian history.

LES MISERABLES, *la me za rah'bl',* one of the world's great novels—a "prose epic" which presents a powerful plea for the poor and unfortunate. It was written by the French novelist Victor Hugo, and was published in 1862. Its title means "The Wretched Ones," and the author has supported well his theory that much of the crime of the poorer classes is the direct result of the injustice to which they are subjected. The central figure, Jean Valjean, is a character of great strength and nobility. Forced by dire necessity to steal, he is turned into a veritable criminal by the sort of punishment which is meted out to him, and is saved from a desperate career only by the influence of the saintly Bishop Myriel. Later, when he has made of his own life a beneficent influence, he is thrown again into bitter shame by a malicious enemy, but in the end is saved by his love for little Cosette. The memory of the Bishop is also an inspiration to him throughout his life.

This remarkable romance of Victor Hugo's was written in French, but on the very day on which it appeared in the French bookstalls, it appeared also in five other languages in eight different cities. From the first it was popular, for despite its prevailing gloom it has a note of optimism, a gospel of redemption through love and service. Besides the leading character, there are others of scarcely minor interest, notably Fantine, Gavroche, Marius and Cosette; and the plot which binds them together is a complex one. Few portions of the book are more discussed than the famous description of the Battle of Waterloo, but the reader who takes up the book for the first time will probably find his enjoyment heightened if he omits this and returns to it afterward, when it will not interfere with the movement of the story. Dramatic versions of the story have been presented on the regular stage and in moving pictures. See HUGO, VICTOR. A.MC C.

LESSEPS, *le seps',* FERDINAND, Vicomte de (1805-1894), a French diplomat and civil engineer who achieved fame through his construction of the Suez Canal. He was born in Versailles and served as consul at Madrid, Cairo and other capitals. While on a second visit to Egypt, in 1854, he obtained a charter from Said Pasha to construct a canal which would unite the Mediterranean and Red seas. The Egyptian government defrayed the expense, and this great work, about 100 miles in length, was carried to completion in thirteen years.

The scheme of connecting the Atlantic and Pacific oceans by means of a canal across the Isthmus of Panama had possessed an intense interest for De Lesseps, as well as other scientific men, and in May, 1879, an International Congress convened in Paris to discuss the plan.

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Following that action a company was formed to begin actual work. De Lesseps was appointed to direct the construction and was also made president of the company. After eight years of little progress it was apparent that operations could no longer be carried on with the available funds, and under French management the enterprise proved unsuccessful. See SUEZ CANAL; PANAMA CANAL.

LESSER ANTILLES, *an til' eez.* See ANTILLES.

LESSING, *les' ing,* GOTTHOLD EPHRAIM (1729-1781), a German literary critic and dramatist, the first of the classic German writers of highest rank. His famous *Letters,* published between 1758 and 1765, give him a claim to the title "Father of German Criticism," and his *Laokoön* (1766), which sets forth his theory of the nature of poetry and painting, worked a revolution in the literary taste of his country. In the field of drama his work was likewise epoch-making in character. His first important play, *Miss Sara Sampson* (1755), is the earliest "tragedy of common life" in German literature, and its publication marked the beginning of a new era in German drama. Lessing's fundamental purpose was to emancipate the national thought and taste from French influences; in this he was supremely successful.

He was born on January 22, 1729, at Kamenz, Saxony. At the age of seventeen he entered the University of Leipzig, where he studied, briefly, theology and medicine. His strong liking for theatrical and literary pursuits, however, caused him to abandon his university career, and, settling in Berlin in 1749, he began his life work as a writer of plays and of literary criticism. In 1760 he accepted a secretaryship under the governor of Breslau, but returned to Berlin in 1765. In that city he published *Laokoön* and *Minna von Barnhelm;* the latter is not only his greatest drama, but was considered the best play produced in Germany up to that time.

After an unsuccessful attempt to found a national theater at Hamburg, in 1770, Lessing became librarian at Wolfenbüttel. There he remained for the rest of his life. Of his later works the most important are a series of essays on dramatic art, called the *Dramaturgie;* also *Emilia Galotti,* a powerful tragedy based on the Roman story of Virginia and Appius Claudius; and *Nathan the Wise,* a philosophical drama inspired by the theological controversies which occupied much of his later years.

LETHBRIDGE, *leth' bridj,* the chief city of the Medicine Hat district, Alberta, and the third city in size in the province. It is situated on the Belly River, in the southern part of Alberta, forty-eight miles north of the Montana state line. Lethbridge is the distributing point for this section and for the lumbering and mining districts of Southeastern British Columbia, and is an important railway center. It is a divisional point on the Crow's Nest Pass branch of the Canadian Pacific Railway, and is the terminus of branches to Calgary, 126 miles northwest, and to Cardston and other towns to the south. Medicine Hat is 101 miles east. Lethbridge was incorporated as a town in 1890 and as a city in 1906; in 1912 it adopted the commission plan of government. In 1911 the population was 8,050; in 1916, 9,437.

Lethbridge is located in a district well adapted to mixed farming; it produces live stock, poultry, grain, alfalfa, wool, clay and an abundance of coal. There is a considerable area of the land tributary to the city irrigated. There are five big coal mines here, employing about 2,000 people. The manufactures include flour, machine shop and foundry products, bricks, boots and shoes. A Dominion experimental farm is located here. The city has a post office, a land office and customs building erected in 1914 at a cost of $300,000, a $100,000 courthouse, a Y. M. C. A. building, a high school and a manual training school. Lethbridge is the district headquarters of the Royal Northwest Mounted Police. J.MC C.

LE' THE, from the Greek word *lethe,* meaning *forgetfulness,* was in ancient mythology one of the five rivers of Hades. Its waters made those who drank of them unmindful of the past. Departed spirits before entering the Elysian Fields drank to forget their earthly cares; those who were to return to the upper world in new bodies drank that they might have no recollection of Elysian joys. The word is used figuratively to denote oblivion or forgetfulness, as in Shakespeare's *Antony and Cleopatra:*

> The conquering wine hath steeped our sense
> In soft and delicate Lethe.

LETTER OF CREDIT. See CREDIT, LETTER OF.

LETTERS, *let' erz,* as a branch of literature, have a peculiar advantage over other forms, in the greater freedom and spontaneity which are possible to them. Not being intended for publication, they may be intimate and private, revealing clearly the personality of the writer

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and possessing much of the charm of spoken conversation. The term *epistle* is sometimes applied to more formal productions which are written in letter style, but which are really a setting forth of the author's views intended for publication. This distinction is not always adhered to, however.

Very early examples of letters are extant, among them the famous Amarna Letters in cuneiform characters, but the difficulty of transmission limited such communications to those on topics of the utmost importance. Among the Greeks they became somewhat more common, and the world possesses letters of Socrates, Aristotle and Demosthenes. The personal note was not particularly strong in any of these, but the Romans, notably Cicero, produced letters which approached much more closely the modern manner. All of these ancient letters, of whatever type they may be, are of great value in the study of history and civilization. The Epistles in the Bible are in part personal letters, in part more formal documents.

To those who are interested in the real lives and personalities of famous people, no form of literature is more attractive than the letters which in modern times have been published in large numbers. No one, for instance, can really understand Swift who has not read, along with his bitter satires, the *Journal to Stella,* with its charming and intimate nonsense. Among Swift's contemporaries who wrote notable letters are Pope, Lady Mary Wortley Montague, Bolingbroke and Arbuthnot; Chesterfield's letters to his son, written with the purpose of forming the young man's manners, are remarkable for the ease and grace of their style. Somewhat later, Cowper wrote letters which are among the most charming ever published, their quiet humor making even more pathetic the gloom with which the poet's life was overcast.

In the nineteenth century, special attention was paid to letters, and few indeed were the famous men and women whose correspondence was not published after their death. These letters are, of course, of all styles, those of George Eliot, Lamb, Byron, Dickens, Mrs. Carlyle, Lowell and Stevenson having each a charm of their own. Dickens' correspondence shows a sprightly humor, a keenness of observation and a zest for life as great as is shown anywhere in his novels, while Stevenson's *Vailima Letters* present an inspiring picture of an heroic man working against great odds.

Epistles in verse have been popular at times since the age of Horace, the great master of that form, but these are usually essays or sermons on philosophical or moral topics rather than true letters. In English, Pope made the greatest success with this somewhat artificial form of verse. A.MC C.

LETTER WRITING. Letter writing is the most common form of composition. After leaving school one is seldom called upon to write essays, but scarcely a week goes by when one does not have occasion to write one or more letters. There is not an occupation or a condition of life that does not require the writing of letters.

Underlying Principles. An understanding of the following principles is essential to all good letter writing:

1. *Correct English.* A person will not write more correctly than he speaks, and a knowledge of correct letter writing is impossible without an understanding of correct English forms and idioms and of the rules governing the construction of sentences. The first step in acquiring the art of letter writing is therefore a thorough study of English. For directions for this study see LANGUAGE, subtitle *Steps in the Study of Language;* also GRAMMAR.

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2. *Clearness of Expression Depends upon Clearness of Thought.* As one thinks so will one speak or write. Letters containing long, involved sentences are tiresome to read and difficult to understand. Accustom yourself to think clearly and to express your thought in short sentences that follow each other in natural order.

3. *Knowledge is Essential to Expression.* If you are to write a letter that will attract attention you must not only have something to write about but you must know your subject so well that you can present it in a clear and interesting manner. A successful correspondent of a great business house is able to write letters that compel attention because he is master of his subject and because he can express himself in clear and simple language.

4. *Personality.* We write letters because distance makes conversation impossible. Letter writing, then, is talking to our correspondent with the pen. Into no other form of composition does the personality of the writer enter so fully, whether the letter be one of friendship or of business. This is why letter writing is such a fine art. The feelings, thoughts, character and ideals of the writer are revealed through his descriptions and narrations, if the letter is a social one, or in his attitude if the letter is of a business nature. The most charming letters are those in which the personal element is so strong that the writer seems to be at the reader's side telling the story. Ability to inject one's personality into one's letters depends largely upon familiarity with the subject and the facility with which one can express oneself in writing. In this as in other arts practice leads to perfection.

Classes of Letters. Letters may be divided into three classes—social letters or letters of friendship, business letters and formal letters which include notes of invitation and acceptance, etc., and official correspondence. The average correspondent may now and then have occasion to write a formal note, but formal official letters are written only by those holding official positions.

Form of a Letter. Certain conventional forms are in general use in correspondence. These forms have been adopted because they seem best suited to their purpose, and any variation from them is likely to subject the writer to criticism. According to established usage the parts of a letter are the ***heading,*** the *introduction,* the *body,* the ***complimentary*** *close* and the *superscription.*

The Heading. The heading includes the address of the writer and the date. This should be placed in the upper right hand corner. It may occupy two or three lines according to the taste of the writer. In most printed letterheads two lines are used. When three lines are used the street and number should be written on the first, the town and state on the second and the date on the third.

The Introduction. The introduction includes the name and address of the one to whom the letter is written just as they should appear on the envelope, and the salutation, as *Dear Sir; Dear Mr. Blank,* etc.

The Body of the Letter. This is the most important part of the letter. "A good letter appeals to the reader in two ways: first, in the

(*Heading*)
25 N. State Street,
Chicago, Ill., May 2, 1917.

(*Introduction*)
Mr. James Black,
50 Bromfield Street,
Boston, Mass.

(*Salutation*)
Dear Sir:

(*Body of the letter*) * * * * * * * *
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(*Complimentary Close*)
Very truly yours,
Thomas Ryan.

mechanical make-up and, second, in the presentation of the subject matter." A letter divided into short paragraphs is more attractive and more easily read than one arranged in long paragraphs. A letter in which simple words and short sentences are used is more easily read and understood than one containing uncommon words and long, involved sentences. The writer should write what he wishes to say in the clearest and simplest possible manner.

Complimentary Close. This is used as a matter of courtesy and varies in different classes of letters.

The Superscription. The superscription is the address upon the envelope, and it should be an exact duplicate of the address in the letter, unless the number of the post office box is necessary, or the letter is sent in care of

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another person. These directions do not appear in the address. A period should follow abbreviations, and a comma should separate town and state when written on the same line; sometimes no other punctuation is used, but the following is considered the best form:

Mr. Amos Kellogg,
540 N. State Street,
Chicago, Illinois.

The writer should place his name and address in the upper left-hand corner of the envelope. It may be either written or printed.

The model on page 3388 shows the arrangement of the different parts of a letter. This is a good arrangement for all letters except formal notes. The reader is urged to study carefully the punctuation and capitalization of each part.

Social Letters. Social letters form the greater part of most people's correspondence. The more intimate the correspondents are, the less formal letters may be. However, as a means of safety, in case the letter should be missent or lost in the mail, the heading, the introduction and the full name of the writer should each be written in its proper place. The form of salutation may be unconventional when the letter is from one member of a family to another, or when the correspondence is between intimate friends, as, Dear Mother; Dear Sister May; Dear John, etc. When the letter is to one with whom the writer is but slightly acquainted the salutation should be more formal, as, Dear Mr. Brown; Dear Miss Jones. What has been said of the salutation applies also to the complimentary close. In case the writer wishes to close with such an expression as, "Your loving son, Henry," he should write his full name in parentheses under the first signature. This will enable the letter to be returned to the writer should it be miscarried and eventually reach the Dead-Letter Office (which see). Perhaps all the directions that might be given to secure a good letter may best be summed up in this: Write your social letters when you are in the mood for writing; then will your thought flow readily and you will wield a facile pen.

Business Letters. A large volume of business is transacted by correspondence, and the business letter is yearly becoming of greater importance. A man who can write a good business letter has an advantage over his competitor who is a poor correspondent. The former can write convincing letters that hold the attention of prospective customers, while the letters of the latter are hastily glanced at and cast aside.

Suggestions. The suggestions already given relating to the parts and form of a letter pertain to business as well as to social correspondence. Those which follow are especially applicable to business correspondence:

1. The first impression made by a letter is all important. See that your letter is in good form and on good stationery.
2. Be sure that the words are correctly spelled, and that the punctuation and capitalization conform to the rules given in standard authorities.
3. Use correct English and make your sentences short and clear.
4. Make the letter complete. The letter should contain all that is necessary to its understanding without obliging the reader to refer to letters that have preceded it, unless the writer finds it necessary to refer to a special letter of former date.
5. Be brief. While it is necessary that the letter be complete it should contain no unnecessary words and it should pertain to business matters only.
6. Be courteous. Courtesy costs nothing, but it is one of the correspondent's most valuable assets. Courtesy demands that you treat all with whom you correspond as ladies and gentlemen. However discourteous a correspondent's letter may be, your reply should be couched in courteous language. Sometimes it is wise to delay the reply to a discourteous letter until you have had opportunity to consider all circumstances connected with the case, then "put yourself in the other fellow's place," and your reply will doubtless be satisfactory.
7. Be tactful. Tact means ability to discern conditions and to say or do the fitting thing at the right time. Tact is necessary in answering complaints, in making collections and in securing new business.

Use of Titles. Courtesy demands that some title precede the name of a person or a firm in the introduction. No title is used in addressing corporations, as, The Caxton Company, Chicago; D. C. Heath & Company, Boston. The title *Messrs.* is used in addressing firms comprising two or more individuals, as, *Messrs. Thompson and Brown.* In addressing a firm whose members are women *Madames* is used. In addressing a man without a profession usage requires the abbreviation *Mr.* before the name. *Miss* should be used in addressing an unmarried woman, and *Madam* in the salutation of a married woman. This is also an appropriate title for an elderly woman who is single. *Reverend* is the appropriate title for a clergyman. The title of a bishop in the Roman Catholic Church is *Right Reverend* and of an archbishop *Most Right Reverend.* A physi-

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cian may be addressed as *Doctor,* or the abbreviation *M. D.* may follow the name, as, *Dr. Henry Johnson,* or *Henry Johnson, M. D.,* but only one title should be used. A person holding an important office or one who has held such an office should be addressed as *Honorable.* In addressing the President of the United States or the governor of a state, *His Excellency* is the appropriate title. The title *Professor* should be used only when addressing a member of a college or university faculty; this title is frequently misused. Abbreviations indicating scholastic attainments when they express something not expressed by the title, as, *Rev. Walter Henderson, D. D., LL.D.; Prof. Albert Harkness, A.M., LL.D.,* may follow the name.

Formal Notes. Formal notes are written in the third person and are not signed. The heading is placed below the body of the note. The following are good models:

Invitation

Mr. and Mrs. James Clark request the pleasure of Miss Abbott's company at dinner on the evening of April fifth, at half-past seven o'clock.
March twenty-eighth,
15 Astor Place.

Acceptance

Miss Abbott accepts with pleasure Mr. and Mrs. Clark's kind invitation for April fifth at half-past seven o'clock.
March thirtieth,
157 St. James Street.

Declining

Miss Abbott regrets that absence from the city prevents her acceptance of the kind invitation of Mr. and Mrs. Clark for April fifth.
Philadelphia, April second.

Consult Barrett's *Business English and Correspondence;* Dwyer's *The Business Letter;* Cody's *Success in Letter Writing;* Westlake's *How to Write Letters.*

Related Subjects. The reader should consult the following articles in connection with his study of this subject:

Abbreviations	Punctuation
Language	Spelling

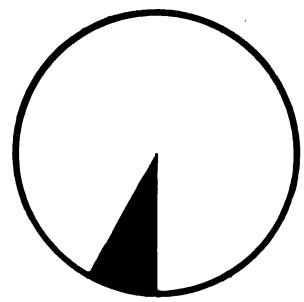
LETTS, a simple-mannered people of Aryan speech, closely related to the Lithuanians, whom they resemble in physical characteristics. They are light-skinned and have fair hair and blue eyes. They occupy an extensive tract in Russia, including Southern Livonia, nearly all of Courland, the right bank of the Dvina River below Drissa in the government (province) of Vitebsk, and a small portion of Kovno. About 300,000 live in East Prussia, their ancient home, called by them *Borussia.* It was under pressure of the Teutonic Knights, who first brought the terror of the German name to the Letts, that they took shelter in their boglands; from there they were driven out by the Prussians, who took possession of their lands.

The Lettish language is rhythmical and pleasing to the ear, and is not unlike the Sanskrit. The poetry produced by the Letts has the fire and vigor of primitive literature, and it is full of the spirit of the warlike age when they "burnt the strongholds of the Russians," "challenged the Polack to enter their land," or "met the foe on the deep." Again it expresses their hatred for their early oppressors, the Germans and Russians. The Letts live on isolated farms, compact villages being rarely found in their district, and they number from 1,350,000 to 2,000,000. Many have emigrated to the United States, where they are mostly day laborers in large cities, and to Brazil.

LETTUCE, *let'tis,* a small garden plant which is widely used as food, especially in salads. Its native home is not known, but it has been cultivated in gardens in most parts of the world for several hundred years. There are two principal varieties, the *cabbage,* or *head,* lettuce, and the *curled,* or *leaf,* lettuce. The first resembles a head of cabbage, and its leaves are very broad and crinkled. The leaves of the latter are longer and smoother. Lettuce may be whitened, as is celery, by protecting the plants from the light.

LETTUCE
(*a*) Head lettuce; (*b*) loose-leaf, or curled, lettuce.

Lettuce seeds are supplied principally from California. They are planted in a rich, loose soil, early in the spring, and the leaves are ready for the table in about six or seven weeks. Lettuce is grown the year round in hothouses. Market gardeners find it profitable to start the plants in the greenhouse, and after they have made a good beginning, to trans-



FOOD VALUE
The black section represents the proportionate amount of nourishment contained in lettuce. The white area represents the part that has no food value.

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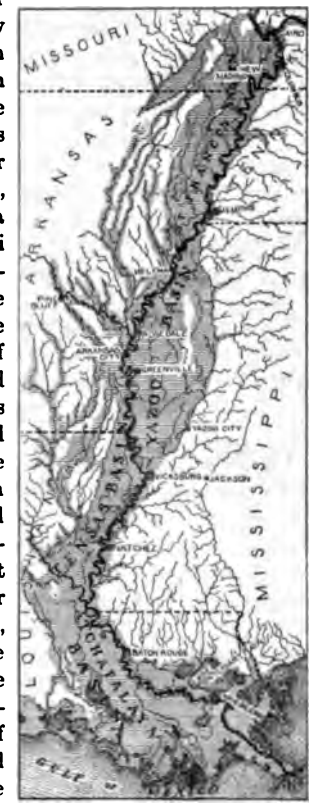
plant them into the outdoor field. The older plants send up a brittle stock filled with a milky, bitter fluid, which bears pale yellow flowers. Though this vegetable is not important for nutritive qualities, yet when eaten raw with vinegar and oil it gives variety to the meal and improves the flavor of other foods.

LEUTZE, *loit'se,* EMANUEL (1816-1868), an American painter, of German parentage, whose work, *Washington Crossing the Delaware,* a reproduction of which hangs in the Metropolitan Museum, New York, is familiar to every American school child. He also painted scenes from the life of Columbus, including *Columbus in Chains* and *Columbus before the Queen.* Among his studies from English history is *Cromwell and His Daughter,* and famous among his numerous paintings depicting scenes from the Revolutionary War are *Washington at Monmouth* and *News from Lexington.* His last work was *Westward Ho,* a mural picture for the staircase of the Capitol at Washington. Another well-known canvas, *Cromwell's Visit to Milton,* is exhibited in the Corcoran Gallery, Washington. Leutze was born at Gemünd, Württemberg, and at an early age came with his parents to Philadelphia, where he received his first instruction in art. For a while he lived at Düsseldorf, but settled in New York City in 1859.

LEVANT', originally meaning *the East,* or the *place where the sun rises,* is the name specifically applied to the coast region and islands of Asia Minor and Syria. It generally designates the coast of the Mediterranean Sea immediately east of Italy, and sometimes is regarded as extending east to the Euphrates and over the Nile Valley, thus including Greece and Egypt.

Levant Morocco, a fine quality of leather made from skins of goats raised in the Levant. Nowhere else in the world is there found such fine quality of skins. While levant morocco should designate leather made solely from goatskins of the Levant, it is a common practice now to call all the finer goat leathers by that name.

LEVEE, *lev'e,* or *le vee'* a wall or embankment built along the banks of a river to keep it from flooding the surrounding country during seasons of high water; the name is from the French word *lever,* meaning *to raise.* In the United States the term is applied specifically to the walls along the lower end of the Mississippi River in the flood districts. The first, which were but three feet in height, were begun in 1718 at New Orleans to keep the river from overflowing a strip of fertile land along its course, and the work on them progressed slowly but steadily. However, the seven states along the "Father of Waters" below its junction with the Ohio soon realized that the undertaking was too expensive for them, and in 1882, the year of a great Mississippi flood, the government set aside $1,300,000 for the improvement of the river, and part of this amount was used for work on the levees. Between that time and 1903 the government gave about $18,000,000 for their construction, but it cost the states in the levee districts over $40,000,000, most of which was raised by local and state taxation.



MISSISSIPPI LEVEE DISTRICTS

The shaded areas show the 20,000,000 acres which are protected by levees built along the banks of the great river.

The earth embankments are usually fifteen feet high, the tops eight feet wide, and the sides slope to a width of thirty feet at the base. At the present time (1917) there are 1,490 miles of levees extending along the Mississippi, but these are still insufficient fully to control the overflow. The Southern river states feel that since the waters which do so much damage are drained from all parts of the central United States, the national government should bear the expense of constructing proper flood protection. See MISSISSIPPI RIVER.

Consult Humphrey's *Floods and Levees of the Mississippi River.*

LEV'EL, an instrument made use of to prove horizontals, used principally by carpenters, masons and other builders, and by surveyors. The *spirit level,* the most accurate,

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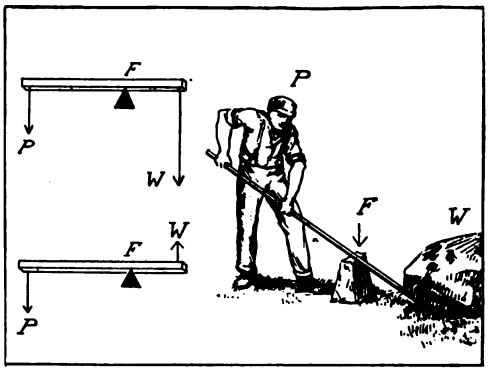
has a bubble of air in a glass tube containing alcohol or some other spirit. The tube is slightly curved upward toward its center, so when the instrument is in a horizontal position the bubble, rising to the highest point, will be exactly at the center. In a carpenter's or mason's level the spirit tube is contained in a wooden bar. A second tube is often placed across the end of the instrument, for testing vertical surfaces. In using such a level it is well to reverse it after the first test, because of possible inaccuracy in its construction. If the bubble is at the center line in both tests, the instrument is reliable. Surveyor's leveling instruments usually contain spirit levels.

An older form of carpenter's level was a plumb-line fastened to a *T*-shaped frame. When the line hung parallel with the stem of the *T*, the crossbar was known to be horizontal.

LEVER, *le'ver,* or *lev'er,* in physics, one of the simple machines by which work is accomplished. It consists of a rigid bar which can be moved about a fixed point, and is illustrated by the familiar seesaw of the children's playground. A plank is balanced across a sawhorse, and a child sits at each end of the board; as the board is set in motion, work is done, for the children move up and down. In this case the support upon which the board rests represents the *fulcrum* of a lever; the parts of the board between the children and the support are the *arms;* the weight at the end which is in the air represents the force used to move the board and is called the *power,* and that at the other end represents the object to be lifted, or the *weight.* The part between the fulcrum and the point where the power is applied is called the *power arm;* that between the fulcrum and the weight is the *weight arm.*

If you multiply the weight by the distance it is moved, you have the amount of work done by the lever (see FOOT-POUND). If you multiply the power exerted by the distance it travels in doing the work, you have the same result. It is plain, therefore, that if the power moves a shorter distance than the weight, it must be greater than the weight, but if it travels a longer distance, it may be less than the weight. This principle is what determines the relative efficiency of the three classes into which levers are divided, according to the positions of power, weight and fulcrum. These are explained, as follows:

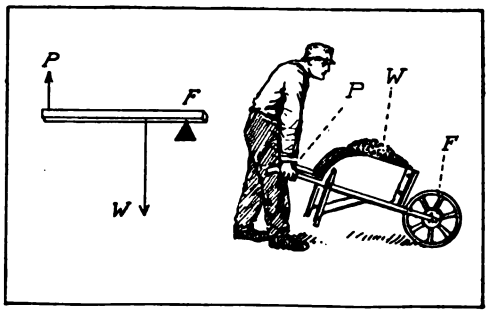
First Class. Levers of the first class have the fulcrum between the weight and the power, as in the seesaw, crowbar, balance scale, pump handle and catapult. Scissors and pincers are double levers of the first class. If the two arms



A LEVER OF THE FIRST CLASS
P is the power; *W*, the weight; *F*, the fulcrum. A pump handle and a crowbar may represent the figures at the left, and at the right is shown the mechanical value of the crowbar. If the distance from *W* to *F* is half that from *F* to where *P* is applied, *P* (or the power in pounds) need be only half that of *W* in order to move *W*.

of the lever are equal, the power must equal the weight; if the power arm is longer than the weight arm, as in the crowbar, so that the power travels farther than the weight, the power can be less than the weight.

Second Class. In this division the weight is between the power and the fulcrum, therefore the power always travels a greater distance (as in the wheelbarrow shown in the sketch) and is less than the weight. An oar is another



A LEVER OF THE SECOND CLASS
In lifting the weight (*W*) the power (*P*) is always less than *W*, because it is farther from *F* and moves a greater distance.

example; a nutcracker is a double lever of this class.

Third Class. Levers of this class have the power between the weight and the fulcrum. As the positions of weight and power are exactly opposite to their positions in the second.

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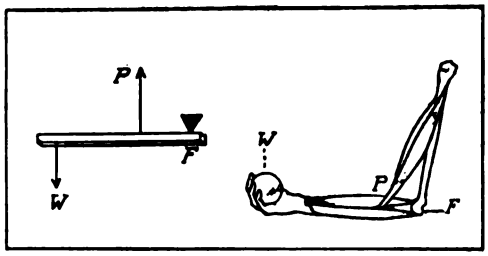
class, the power travels a shorter space than the weight, and must be greater. Examples are sugar tongs (double lever) and the forearm. In the latter case, the fulcrum is the



A LEVER OF THE THIRD CLASS
Here *P* (power applied) must always be greater than the weight (*W*), but speed is gained, for when *P* moves one inch, *W* moves several inches.

elbow joint, and the power is the biceps muscle attached to the radial bone of the forearm close to the joint.

Levers of the first and second classes sacrifice speed to gain power, that is, to do work with less effort; while those of the third class gain speed at the sacrifice of power.

Compound Levers are combinations of two or more levers, whose purpose is greatly to increase the power. By applying the principle of the compound lever it is possible to balance such heavy loads as a ton of hay by just the weight of the hand (see WEIGHING SCALE).

Law of Equilibrium. A lever is said to be in *equilibrium* when the power and weight balance each other. According to the law of equilibrium, *the power multiplied by the length of the power arm is equal to the weight multiplied by the length of the weight arm.* For example, in a lever of the first class which is three feet long and has a fulcrum one foot from the weight end, a power of one pound would balance a weight of two pounds. C.R.M.

LE'VER, CHARLES JAMES (1806-1872), an Irish novelist who wrote many adventurous romances. He was born in Dublin, was educated at Trinity College, afterwards studying medicine at Göttingen, Germany. In 1832 he gained considerable reputation for his skill in the treatment of cholera, which was then prevalent. The first chapters of *The Confessions of Harry Lorrequer* were published in 1834, and were so favorably received that he adopted Lorrequer as his *nom de plume* and thereafter devoted himself to literature. His work was remarkable for vivacity and for happy pictures of Irish manners and life. Between 1840 and 1872 he wrote about thirty novels, among the later ones being *Charles O'Malley, the Irish Dragoon, Jack Hinton, Arthur O'Leary* and *Saint Patrick's Eve.* He was appointed vice-consul at Spezia in 1858 and in 1867 was transferred to Trieste, which consular post he held until his death.

LEVIATHAN, *le vi' a than,* a sea monster mentioned several times in the Old Testament. From the description given of it in *Job* XLI, it is believed to have been the crocodile, but other Scriptural references to it have been interpreted as meaning the whale. Modern usage applies the term to anything of vast proportions. On account of his superb mentality, Doctor Samuel Johnson was called the *leviathan of literature.* A great ocean vessel is commonly referred to in a boasting way by the name.

LÉVIS, *lee' vis,* or in French, *lay vee',* the county seat of Lévis County, on the Saint Lawrence River, directly opposite the city of Quebec. It is served by steamers on the river and by the Grand Trunk, Quebec Central and Intercolonial railways, and has ferry connection with Quebec. Lévis is a picturesque town, high above the Saint Lawrence, and has many interesting old houses. It is also important industrially, for it has a shipyard, tanneries, boot and shoe, knitting and cigar factories. One of its unusual industries is the making of wax tapers. It has the Lorne dock, a government graving dock 445 feet long and 100 feet wide. Lévis is strongly fortified, and is protected by batteries crowning the heights from which Quebec was bombarded in 1759. The town was named for François Gaston, Duke of Lévis (1720-1787), who was second in command of the French troops under Montcalm, and after the latter's death kept up the hopeless fight against the British. Population in 1911, 7,452; in 1916, about 8,000.

LE'VITES, in Old Testament history, were the descendants of Levi, who were selected, probably by Moses, to care for the Tabernacle and its services. They guarded the sacred symbols, administered the rites of worship and transported the Tabernacle and its furniture when the camp moved. When Canaan was divided among the various tribes of Israel no especial part of the land was given to them, for they were scattered in forty-eight towns, thirteen of which were set apart for the priests. During the period of the Judges and the United Kingdom among the Israelites, the Levites reached their highest power as priests, but later the priesthood was restricted to the house

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of Aaron (*Numbers* XVIII, 1-7), while the Levites discharged inferior duties about the Temple. They are seldom mentioned in the New Testament.

LEVITICUS, *le vit'i kus,* the third book of the Pentateuch, forming with *Exodus* and *Numbers* the literature of the period of the *Exodus,* or the *going out.* It contains the laws of the Israelitish sacrifices, an account of the consecration of the priesthood and a collection of laws known as the *holiness code.* According to modern scholarship, the holiness code shows marks of having been revised at a later date, probably to meet the needs of the period following the Exile. See PENTATEUCH.

LEWES, *lu'is,* GEORGE HENRY (1817-1878), an English philosophical writer and man of letters. Though he was a man of scholarly attainments, it is chiefly through his association with the gifted novelist, George Eliot, that he is of interest to the reader of to-day. He was born in London, and was educated in England and Germany. He abandoned the study of medicine for literature, and in 1845 published his *Biographical History of Philosophy,* which proved his ability as a thinker and writer. From 1849 to 1854 he was literary editor of the *Leader,* and in connection with editorial duties published a *Life of Robespierre,* a summary of Compte's *Philosophy of the Sciences* and *Life of Goethe,* the last winning for him a reputation throughout Europe. His *Studies on Animal Life, Physiology of Common Life* and *Seaside Studies* belong to the period of his investigations in physiology with reference to problems in philosophy. Lewes was also the author of *Problems of Life and Mind* and *The Spanish Drama; Lope de Vega and Calderon,* and he also prepared a number of plays for the stage. Two novels, written in 1847 and 1848, found no permanent place in literature.

In 1854 his association with Marian Evans (George Eliot) began, proving wholly different from his unhappy marriage with Agnes Jervis. There were legal difficulties which prevented his securing a divorce, but so strong was the affection of the novelist for him, and so dependent upon him was she for sympathy and encouragement in her literary work, that she endured the censure of her friends and lived with him as his wife until his death. See ELIOT, GEORGE.

LEWIS, *lu'is,* MERIWETHER (1774-1809), an American explorer, famed as the leader of the expedition which was sent by President Jefferson in 1804 to explore the uncharted wilds of the territory included in the new Louisiana Purchase. Lewis chose as his companion in this undertaking an old friend, Captain William Clark; the results of that famous trip to the New West are stated in the article LEWIS AND CLARK EXPEDITION. Lewis was born near Charlottesville, Va., of a family connected by marriage with George Washington. At the age of twenty he became a volunteer in a body of militia, and on the outbreak of the Whisky Rebellion of 1794 joined the troops which were commissioned by the government to quell the insurrection. Having become an ensign in the regular army, he rose to the rank of captain, and in 1801 was appointed President Jefferson's private secretary.

MERIWETHER LEWIS

Lewis' offer to lead the exploring expedititon westward was gladly accepted by the President, who later paid tribute to the "undaunted courage and firmness of purpose" of the young officer. Congress, in recognition of his services, granted him a tract of 1,500 acres of the public domain. In 1807 Jefferson appointed him governor of Louisiana Territory, with headquarters at Saint Louis, and in this position he showed high ability as an administrator. In 1809, while on his way to Washington, D. C., on a business matter, he was mysteriously slain in the cabin of a Tennessee settler. His untimely death stopped his work on a history of his great exploration. See LOUISIANA PURCHASE.

LEWIS AND CLARK EXPEDITION, an American exploring tour ordered by Thomas Jefferson, President of the United States, after the purchase of Louisiana in 1803. "Let us search out our new country," said Jefferson, "and even that which lies beyond." One band of explorers, commanded by Meriwether Lewis and William Clark, both Virginians, left Saint Louis on May 14, 1804, and went 1,600 miles up the Missouri River. They spent the winter among the Mandan Indians, near what is now known as Bismarck, N. D. Men were sent back with reports to Saint Louis in the

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following April, and the expedition pressed on. In September, 1805, the Rocky Mountains were crossed, and the Pacific Ocean came in sight on November 7. After spending the winter on the coast, the party started on its return trip in March, 1806, and arrived in Saint Louis on

ROUTE OF THE EXPEDITION

September 23, after an 8,500-mile journey, to tell a wonder story of the vast continental empire no white men had ever before seen. Much valuable information concerning the climate, geography and animal life of the region was secured. On this expedition was based the claim of the United States that brought the nation eventual ownership of the great Oregon country. The story of Lewis and Clark has been entertainingly told by Parkman in his *Oregon Trail*. See LEWIS, MERIWETHER; CLARK, WILLIAM.

Sacagawea. One woman accompanied the expedition in the most difficult part of its journey, from Bismarck to the coast and back. She was Sacagawea, Indian wife of the party's French-Canadian interpreter. Born among the Shoshonee, or Snake, Indians, in what is now the state of Idaho, she had been captured by another tribe when a young girl and sold to her husband. When the Lewis and Clark party passed through the country in which she had spent her girlhood she was able to render invaluable service, guiding it through the mountains and persuading the Indians of her tribe to furnish horses and give other assistance. A statue to her has been erected in Portland, Ore.

THE SACAGAWEA STATUE

Erected by the women of the United States in memory of the only woman of the Lewis and Clark expedition, and in honor of the pioneer mother of the Oregon country. In *a*, in the illustration, is shown both statue and its pedestal.

Lewis and Clark Exposition, an industrial exposition, also called the AMERICAN PACIFIC EXPOSITION, held in Portland, Ore., in 1905 to commemorate the anniversary of the Lewis and Clark expedition. On May 30, 1903, Congress passed an act to celebrate the exploration of the Oregon country and appropriated the sum of $500,000 for the purpose. Missouri, the state (later) from which the expedition started, appropriated $500,000, and each of the states of the Northwest contributed. Portland was chosen as the site, as it was the point where the explorers spent the winter in 1805; the exposition structures were all reminders of the changes brought about during one hundred years of advancement.

LEW'ISTON, IDAHO, the county seat of Nez Perce County, and the center of a prosperous mining and agricultural district. It is situated on the Idaho and Washington boundary line, 147 miles south and east of Spokane, and is at the head of navigation on the Snake River, at the mouth of the Clearwater River. The city is served by the Northern Pacific Railroad and the Oregon-Washington Railroad & Navigation Company. Population, 1910, 6,043.

Lewiston, though one of the oldest places in the state, is a thoroughly modern town. It is the seat of the state normal school and has the Supreme Court Library, a Carnegie Library, Saint Joseph's Hospital and a United States Weather Bureau station. It is the outfitting point of an extensive mining country, and has important lumbering, fruit-growing, dairying and stock-raising interests. Flour and boxes are manufactured. Lewiston became a city in 1890, and later adopted the commission form of government. J.A.

LEWISTON, ME., an important manufacturing city, situated in Androscoggin County, in the southwestern part of the state, on the east bank of the Androscoggin River, thirty miles from the ocean. Portland is thirty-five miles south. The Grand Trunk, the Portland & Rumford Falls and Maine Central railways serve the city. Electric lines connect with Portland and Brunswick on the coast and with Augusta, thirty miles northeast. In 1770 the settlement was known as the Plantation of Lewiston; it was incorporated in 1795 and chartered as a city in 1861. In population it ranked second in the state in 1916, having 27,809 peo-

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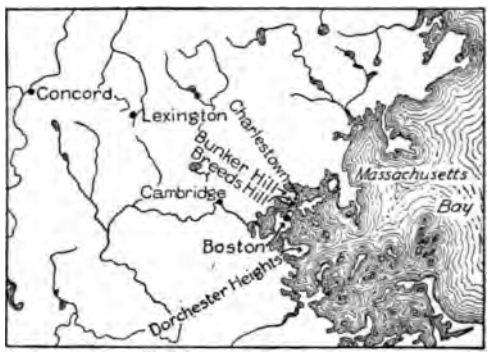
ple (Federal estimate); in 1910 it had 26,247. Three-fifths of the people are foreign born; among these French predominate.

Androscoggin Valley, in which Lewiston is located, is a fertile, prosperous country, and the city as its center has an important trade in live stock and grain, but it is distinctly a manufacturing city. A great variety of cotton fabrics is woven in its six large cotton mills, and the three woolen mills produce considerable quantities of blankets, beaver, cassimere and melton cloths. The cotton and woolen mills employ about 7,000 people. In connection with the textile industry the city has one of the most noted bleacheries and dye works in the United States. There are also manufactories of leather belting, machinery for weaving mills, carriages and foundry products. The Androscoggin River at this point has a fall of sixty feet, furnishing plentiful water power, which is utilized by an extensive system of canals and dams. Four steel bridges span the river and connect with the city of Auburn, on the west bank.

Lewiston has a $225,000 city hall, an $85,000 post office, and is the state headquarters of the Shriners. In addition to the public school system there are large parochial schools, a business college and Bates College (Free Baptist), founded in 1863, the first college in New England to open its doors to women. There is also a Carnegie Library. An interesting feature of the vicinity is the Maine Fish Hatchery at Lake Auburn, north of the city. J.L.R.

LEW'ISTOWN, PA., the county seat of Mifflin County, south of the center of the state, about eighty miles northwest of Harrisburg, the state capital. It is on the Juniata River and on the Pennsylvania Railroad, and is surrounded by a fertile and hilly agricultural country. There are deposits of iron and glass sand in the vicinity, and the city has steel works, foundries, furnaces and manufactories of lumber, flour, silk, edge tools and hosiery. The number of inhabitants in 1910 was 8,166; in 1916 it was 10,733 (Federal estimate).

LEXINGTON, BATTLE OF, the first conflict of the American Revolution, fought on April 19, 1775, at Lexington, Mass., a small town eleven miles northwest of Boston. Thomas Gage had been appointed military governor of Massachusetts, which had been deprived of its charter, and whose principal port, Boston, had been closed by order of the king. Gage's authority was never recognized by the colonists, and the work of arming the colonial militia for defense went steadily on. In the spring of 1775 Gage was ordered to seize John Hancock and Samuel Adams, "arch traitors." On April 18 he mustered 800 men, whom he



MAP OF BOSTON AND VICINITY

ordered to march on Concord, seize the military supplies and arrest Hancock and Adams at Lexington. His plan was at once suspected by the members of the Boston League, one of whom, Paul Revere, rode from Charlestown to Lexington, rousing to arms the country along his route. Longfellow, in *Paul Revere's Ride,* describes this famous episode in graphic language:

> So through the night rode Paul Revere;
> And so through the night went his cry of alarm
> To every Middlesex village and farm,—
> A cry of defiance and not of fear.

When Gage's men reached Lexington they found seventy militiamen confronting them. There the first shot of the American Revolution was fired, and eight militiamen were killed. At Concord the British found the stores removed and a force of 400 men awaiting them. Although the English were reënforced by 1,000 men, they retreated toward Boston, losing 273 of their number.

PARKER MONUMENT
Erected to the memory of Captain John Parker, commander of the "minutemen" at Lexington.

Consult Hudson's *History of the Town of Lexington.*

LEXINGTON, KY., the county seat of Fayette County, situated northeast of the center of the state, thirty miles southeast of Frank-

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fort, the capital, ninety miles southeast of Louisville and eighty miles south of Cincinnati. The Louisville & Nashville, the Chesapeake & Ohio, and the Cincinnati, New Orleans & Texas Pacific railways reach the city, and interurban lines connect with towns north, east and west. The area is nearly five square miles. In 1910 the population was 35,099; in 1916 it was 41,097 (Federal estimate).

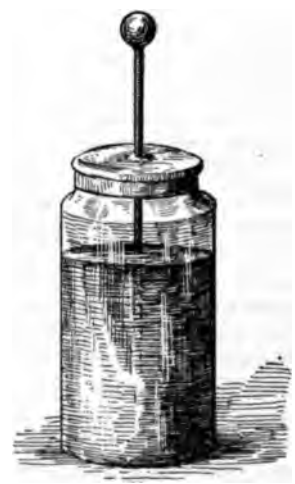
Lexington is located in the famous "blue grass country," which produces an abundance of tobacco and has some of the finest stock farms in the world. The race tracks of Lexington have long been noted. The greatest industrial product is tobacco, and it is one of the city's principal assets, the annual sales amounting to more than four millions of dollars. There are extensive manufactures of distilled and malted liquors, flour, foundry products, carriages, harnesses, saddlery and canned goods and soap.

Owing to its exceptional educational advantages the city is locally called the *Athens of the South;* its institutions include the Kentucky University, Transylvania College, Hamilton and McClelland female colleges, Saint Catharine's Academy (Roman Catholic), the State Agricultural and Mechanical College, the Industrial Home for Negroes and a Carnegie Library. The city also has the state reform school and the state insane asylum, Good Samaritan and Saint Joseph's hospitals and High Oaks Sanitarium. Among notable buildings are the Federal building and the courthouse. There is also a United States Weather Bureau station. Features of interest are Woodland Park and monuments to Henry Clay, John C. Breckenridge and John H. Morgan.

The first settlement was made in 1775 by hunters, who built a cabin to confirm their title to the land. News of the Battle of Lexington reaching them at this time, they promptly gave the name Lexington to their settlement. Four years later a permanent settlement was made, and in 1782 the town was incorporated by the Virginia legislature, as this section was then a part of that state. In 1792 Kentucky became independent of Virginia, Lexington was made the temporary state capital, and the first legislature met here. A city charter was granted in 1832, and the commission form of government was adopted in 1913.

LEYDEN, *li'den,* the birthplace of the distinguished artists Rembrandt, Jan Steen and Gerard Dou, and the seat of what was formerly one of the most celebrated universities in Europe. It is a city of the Netherlands, on the old Rhine River, twenty-two miles southwest of Amsterdam. It is a typical Dutch town, with wide streets, spotlessly clean, and with canals bordered by avenues of trees. Leyden manufactures cloth, cotton, twine, etc., although it is no longer as famous for its textiles as it was during the fifteenth century. It is essentially an educational center, and its university, which once attracted students from all parts of Europe and included in its faculty the greatest names in the world of learning, is still a flourishing institution. In conjunction with it there are an observatory, a museum of natural history, one of the finest of its kind in Europe, and a museum of antiquities. This institution was founded by William of Orange in 1575, as a reward to the citizens for their heroic defense in the siege against the Spaniards in 1573-1574. Population, 1913, 59,500.

LEYDEN, *li'den,* **JAR.** When you hear the loud crackling sparks as a wireless operator makes dots and dashes with his key, electricity is being discharged from a Leyden jar, or electric condenser. But the professors at the University of Leyden, Holland, who accidentally discovered about 1745 that a glass bottle with a nail through its cork touching water inside would store "the electric fluid," certainly never dreamed of such an important use for their toy.


ORDINARY LEYDEN JAR

The usual type of Leyden jar does not contain water, but has a coating of tin foil on more than half of its inner and outer surfaces. The brass rod which passes through the cork is connected with the inner coating by a hanging chain or by springs. If the outer coating is connected with the ground and positive electricity is conducted to the inner side of the glass through the brass rod, the outer side will give off its positive electricity but will retain its negative. If wires from the two are then brought together the electricity is discharged with a bright spark. A

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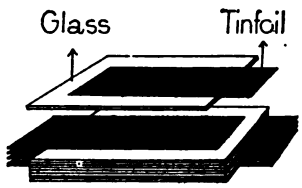
Leyden jar has a definite capacity, depending on the thickness and quality of the glass and the surface of the tin foil; the charge of electricity is not in the coatings, but in the glass itself.

A number of Leyden jars may be connected either in parallel or series (see ELECTRICITY) to form a battery. This is a satisfactory form for small wireless stations, but the battery of Franklin panes is more usual because it occupies less space. It is often enclosed in a wooden box containing oil or wax to prevent leakage of the charge.



CONDENSER FOR WIRELESS TELEGRAPHY
A battery of Franklin panes, so called in honor of Benjamin Franklin.

The spark given off by a condenser is not continuous. If you hit a punching bag it will bound back and forth several times with gradually lessening force. The discharge of electricity from a condenser acts in a similar fashion, the first outward rush being quickly followed by several inward and outward rushes of decreasing intensity, forming the *high frequency oscillations* which are the source of the waves used in wireless telegraphy. The movement in each direction requires from one one-thousandth to one ten-millionth part of a second. C.R.M.

LHASA, or **LASSA,** *lah'sah,* the capital of Tibet and the holy city of the Tibetans, is also known as "the Forbidden City," for no European since 1846 has succeeded in reaching its sacred temples. Lhasa proper is a closely-packed assemblage of stone and brick dwellings and shops, interspersed with many temples. Outside the wall which surrounds the city are about fifteen monasteries scattered through the suburbs and over the plains. Paper, oiled or plain, serves as windows for the curiously-constructed dark houses, the light for which at night is furnished by torches or primitive lamps fed with vegetable oil. The women, who go about with perfect freedom, stain their faces with black spots. Besides being the great religious center of the Buddhist faith, Lhasa is important as a trading center, being the terminus for caravans to and from India, Kashmir, Burma, China, Mongolia and Turkestan. Tea, silks, carpets, rice and tobacco are the chief articles of commerce. The resident population, not including the garrison and the monks, is about 15,000, although this number is greatly increased by a floating population of pilgrims and traders, ranging from 40,000 to 80,000.

LIBAU, *le'bou,* in Russian, LIBAVA, is a fortified Baltic seaport in the southern part of the province of Courland, Russia, near the German border. The city is divided into a new town and an old town. The old town, fortified by the Livonian Knights in 1301, is typical of the Middle Ages, with narrow, crooked streets and tall, dark houses and old walls, but the new town is a beautiful section, with broad streets and fine squares, great business blocks, crowded docks and rows of warehouses. The harbor of Libau is excellent, and for pleasure-seekers there is a good beach. Libau is chiefly important as a naval station and commercial port, for besides its manufactures of farm machinery, flour, arms, sails, ropes and furniture, there is a large inland trade in grain, flax, linseed oil and petroleum. In the German invasion of 1915, Libau, after several bombardments, both by land and by sea, fell to the Germans, who appropriated for their own use the great shipbuilding yards and gun factories (see WAR OF THE NATIONS). Population, 1913, 90,400.

LI'BEL, in law, a false statement expressed either in print or in writing, which tends to reflect on a person's reputation, or exposes him to hatred, contempt or ridicule. Spoken words, however much they may defame, are classed as *slander,* and as they are not so permanent a record as written words, the offense is not so great as in libel. Libel is also considered to show greater enmity on the part of its author. The exhibition of a libelous picture is an act as criminal as a false statement in print. If the libel is seen but by one person other than the person libeled, publication is held to have taken place. In the United States and Canada a libel is ground for civil action in court for damages, and if malicious it is an indictable offense punishable by imprisonment, the term of which is fixed by statute.

LIB'ERAL PARTY, in Great Britain, Canada and Australia, the name of the political organization which opposes the Conservative party. It was the successor in England of the Whigs, and developed rapidly in the colonies, appealing to the people as the party of liberal ideas, supporter of the principle of political freedom and pledged to progressive legislation. About 1850, when the party was assuming definite standards, it was stated, "A Liberal is he who looks forward for his principles of government; a Tory (Conservative) looks backward."

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William E. Gladstone was the greatest Liberal leader; later worthy successors have been Joseph Chamberlain, Lord Rosebery, Sir Henry Campbell-Bannerman, H. H. Asquith and David Lloyd George. Since 1855 the Liberals have controlled the English Cabinet considerably more than half of the time.

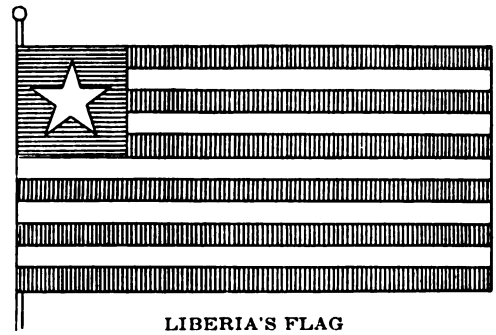
LIBERAL REPUBLICAN PARTY, an American political organization, formed in 1872 as a party of protest against the reëlection of President U. S. Grant. It was composed of seceders from the Republican party, who nominated Horace Greeley for the Presidency on a platform of "universal amnesty and universal enfranchisement," which meant the establishment at once of civil governments in each of the former Confederate states and the removal of all political disabilities imposed on account of the rebellion. The demands of the Liberal Republicans expressed the view of those who were dissatisfied with the administration's severe policy toward the South. In the election Grant received 286 out of 349 electoral votes; the defeat of the new party was so severe that there was no attempt to continue its organization. Mr. Greeley died between election day and the date of the meeting of the electoral college. See POLITICAL PARTIES IN THE UNITED STATES.

LIBERIA, *li be' ri a,* from a Latin word meaning *free,* is a country on the west coast of Africa, the only negro republic in the world, and believed to have the hottest climate known on the globe. The state of Liberia is the result of the efforts of the National Colonization Society of America, organized in 1816, to establish in Africa a colony for free blacks from the United States. The first steps toward organization were taken in 1820; twenty-seven years later the society withdrew active assistance from the negro settlers, urging them to set up an independent form of government. This was done, and a constitution, patterned after that of the United States, was adopted. It provided for a President, Vice-President, Cabinet, Senate, Representatives, Supreme Court, consuls and a standing army. Since then the United States has given Liberia generous financial aid, loaned it colored officers to train its military forces, taken charge of the customhouses, and has stood as a friend, willing to aid or advise whenever necessary.

LOCATION MAP

STREET SCENE IN MONROVIA

The Country. Liberia's area, 35,000 square miles, is about equal to that of Delaware, South Carolina and Rhode Island combined. A narrow strip of coast land, seven miles wide, is the only part developed. The interior is high and fertile, with forests of valuable woods and deposits of rich metals, and gives great promise of future agricultural possibilities. There are two rainy seasons; the warmest month of the year is January.


LIBERIA'S FLAG
Vertical lines are red; horizontal, dark blue; star and alternate stripes, white.

People and Customs. Liberia's population, divided into three classes, consists of 12,000 negro descendants of American freed slaves; 30,000 English-speaking coast natives; and about 1,000,000 half savage blacks who live in the interior. The latter are heathen; many of them are cannibals and all practice polygamy. So far as their relation with the first two groups is concerned, they might as well live in another world. Divided into tribes living in separate villages, each has its own chief, language and customs. In spite of the great natural wealth of the country, its people prefer

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trading and military life to agriculture, coffee being the only product that is cultivated extensively. Therefore, as the only source of income is customs duties, the people are usually deeply in debt. Palm oil, palm kernels, rubber and ivory are the chief exports.

In 1913 there were over 200 schools, including Monrovia and Liberia colleges, and several religious institutions. English is the official language of the country, and British money, weights and measures are used. They have numerous churches (most of the civilized natives being Episcopalians) and newspapers and a postal system. White men cannot vote in the republic, and may hold land only with the government's consent. The capital, Monrovia, was named for President James Monroe. M.K.

LIBERTY, Statue of, a colossal bronze statue, executed by Frédéric A. Bartholdi and presented to the United States by France in 1885. It was intended to symbolize the historic friendship between the two republics and to typify the idea of freedom and brotherhood which underlies a republican form of government.

The statue was formally presented to the United States on July 4, 1880, through the American minister at Paris. It was erected on Bedloe's Island, in New York Harbor, and was unveiled in the presence of distinguished representatives of France and the United States, October 28, 1886. The statue represents a proud woman, clad in a loose, graceful robe which falls in generous folds from her shoulder to her feet. The right arm holds aloft a blazing torch. The left hand grasps a tablet on which the date of the Declaration of Independence is inscribed. The head is crowned by a diadem. The allegorical meaning of the work was emphasized for several years by using the statue as a lighthouse at night; the torch in the raised hand of the figure contained powerful lights. "Liberty Enlightening the World" illuminated the path of the sailor in the congested harbor of the second largest commercial city in the world. The light was discontinued when the arm seemed to be weakened, and the stairway to the torch was closed.

The statue cost about $250,000. It is the largest ever made, and the most celebrated example of repoussé work—that is, thin sheets of hammered brass on a framework of iron. Three hundred sheets of brass were used, each between one and three yards square, all weighing eighty-eight tons. The statue is 151 feet in height and from the foundation of the pedestal on which it stands it is 305 feet to the torch. There are 100 tons of bronze contained in the figure, and the total weight is 450,000 pounds. The head will hold forty persons; the torch held twelve people. No one is now permitted higher than the diadem which crowns the head; from this height a magnificent view of the harbor, the city and the New Jersey suburbs is obtained. An elevator carries passengers up the pedestal to the foot of the statue, from which point a closely-winding stair leads to the head. In January, 1917, an explosion on an adjoining island damaged the statue. After repairs were completed electric lights were placed so the great statue could be illuminated at night.

Bartholdi, Frédéric A., who designed the statue, was a native of Colmar, in Alsace. He served in the corps of Garibaldi in the war of 1870 and the following year visited the United States. His second best work is the great *Lion of Belfort,* a figure about 91x52 feet in dimension, which is carved from a block of reddish Vosges stone. Bartholdi understood the requirements of colossal sculpture thoroughly and sacrificed all unnecessary details. His other work includes a statue of Lafayette in Union Square, New York, and a bronze group of Lafayette and Washington in Paris, France, unveiled in December, 1895. He died in Paris, October 4, 1904. M.R.T.

LIBERTY BELL, a relic of the early days of American independence, on which is engraved the words "Proclaim liberty throughout all the land until all the inhabitants thereof," (*Leviticus* XXV, 10). It is now in the hallway of the old State House in Philadelphia. Beside the bell is a printed card bearing this information:

By Order of the Assembly of the Province of Pennsylvania for the State House in Philadelphia, Pass and Stow, Philadelphia, MDCCLIII. This bell

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was first cast in England and the inscription put upon it by order of the Assembly of the Province of Pennsylvania in 1752. It broke in ringing after its arrival and was recast in Philadelphia from the same metal, with the same inscription in 1753. It rang on the 8th of July, 1776, to call citizens together to hear the proclamation of the adoption of the Declaration of Independence. In the adjoining yard it rang at each successive anniversary of the adoption of the Declaration until 1835. It broke July 8, that year, while tolling during the funeral solemnities of John Marshall, Chief Justice of the United States, who died in this city.

That old state-house bell is silent,
Hushed is now its clamorous tongue;
But the spirit it awakened
Still is living, ever young.
—ANON.

The dotted line marks a new crack in the Liberty Bell, which is gradually widening and may some day break the bell into two pieces.

The Liberty Bell has been on exhibition at three American expositions: in 1893 it was exhibited at the World's Fair in Chicago, in 1904 at the Louisiana Purchase Exposition in Saint Louis, and in 1915 it was sent across the continent to San Francisco, to be on exhibition at the Panama-Pacific International Exposition. On April 6, 1917, the old bell was lightly struck by Philadelphia officials when announcement was made that the United States was in a state of war with Germany.

LIBERTY CAP, a famous symbol of freedom which appears on certain American coins and on the seals of several Central and South American republics. In ancient Rome a freed slave was given the conical Phrygian headdress, from which the modern liberty cap is copied. Brutus and Cassius used the symbol on coins struck after the assassination of Julius Caesar. At the outbreak of the French Revolution, the *bonnet rouge,* or red cap, was adopted as the badge of "patriots," and Louis XVI was forced to wear it on June 20, 1792, when he was paraded through the streets by the mob which had burst into his palace. It is not certain that the red cap of the French Revolutionists was a revival of the Roman tradition, but its significance is the same.

LIBERTY CAP

LIBERTY PARTY, the first organization in the United States to make the slavery question the leading political issue. The opponents of slavery were not united on a policy concerning that institution; some were disposed merely to arouse strong anti-slavery sentiment by special agitation; others, believing that slavery was a political question, were determined to carry the question into politics. The latter faction believed and argued that Congress, by an ordinary statute, had the power to abolish slavery in the territories; but the states, they believed, must decide concerning slavery within their own borders. The leading supporters of this view were James G. Birney, John G. Whittier and Myron Holley (1779-1841), a New York journalist who was at one time president of the American Anti-Slavery Society. Largely through the efforts of these men a convention was held in 1840 at Albany, where Birney was nominated for President. Though called a national convention, most of the delegates were from New York, and in the ensuing election 2,798 of the 7,000 votes given to Birney were cast in New York.

The leaders were disappointed at the showing, but within a year began a more vigorous campaign for the election of 1844. The party, composed mostly of Whigs, was inclined to support Clay until the publication of his letter saying that he would "be glad to see" Texas annexed at some future time. This concession to slavery angered the abolitionists of the Liberty party and led them to renominate Birney, who polled 62,000 votes, enough to defeat Clay and elect Polk. Polk, however, was a Southern Democrat, and was even less acceptable to the Liberty party than Clay. Its leaders wisely saw that they were injuring rather than helping their cause by maintaining a separate organization, and in 1848 all shades of anti-slavery opinion were united in the Free-Soil party. The Liberty party had nominated John P. Hale for President, but he withdrew when the Democrats and Whigs both declined to take a definite stand on the slavery issue. The Liberty party survived for a few years in some of

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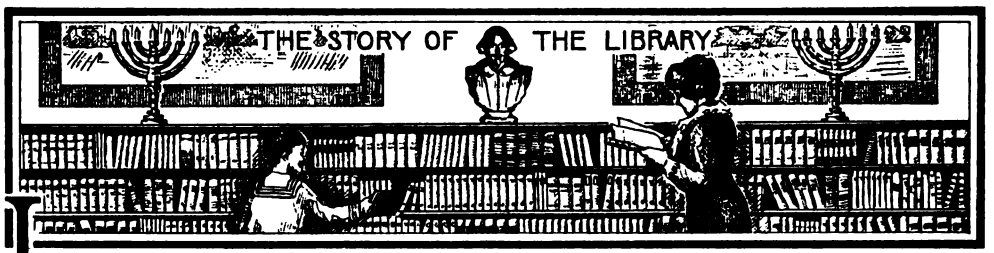
the Northern states as a local organization, but it was finally absorbed by the Republican party in 1856. See POLITICAL PARTIES IN THE UNITED STATES.

LI'BRA, a Latin word meaning *the balance,* is in astronomy the seventh sign of the zodiac, represented by the symbol ♎, resembling a pair of scales. The symbol probably alludes to the fact that when the sun enters that part of the ecliptic at the autumnal equinox (about September 23) the days and the nights are equal. The term also refers to a constellation included by Ptolemy in his forty-eight groups of stars, which is situated south of the celestial equator and east of the sign Virgo. See ZODIAC; ASTRONOMY; ECLIPTIC.



LIBRARY. The term is derived from the Latin *liber,* meaning *book.* The Latin word *libraria,* however, signified a place where books or written documents were kept *for sale,* and in this sense it has been transferred to the modern languages of Latin origin. In English the primary meaning is a building or room in which books are kept, in some sort of order or classification, for reading or study; secondarily, it means the books. Most commonly the word connotes both together. All other modern languages have followed the usage of the ancients in applying the Greek word *bibliotheke* to this conception.

Libraries may be either private or public. The former are the property of individuals who collect and maintain them for their private use or gratification. Public libraries, with which this article is mainly concerned, are those to which the public is admitted. They may be wholly free, in which case they are often called free libraries, or free public libraries, to distinguish them from subscription libraries maintained by fees or subscriptions of members. The latter are still properly classed as public libraries if their privileges are offered upon equal terms to all. Examples of such are the Mercantile and Mechanics' Institute libraries which flourished in great numbers in the United States and England before the introduction of municipally-supported public libraries fifty years ago. Somewhat analagous are the modern commercial concerns which rent or lend books, generally new novels, for a small fee per day or week or for an annual subscription. The name *book exchange* is commonly applied to them.

College and society libraries are also classed with public libraries, as distinguished from private libraries, especially when, as is generally the case, they extend their privileges to educated and properly authenticated members of the community. Public libraries, both free and subscription, may be either *circulating* libraries, permitting the withdrawal of books for home use, or *reference* libraries, restricting readers to the use of books on the library premises. In the United States most free public libraries are both circulating and reference libraries. There are, however, some notable exceptions, as the library of Peabody Institute, Baltimore; the Boston Athenaeum; Pratt Institute Free Library, Brooklyn, and the Newberry Library and John Crerar Library, both in Chicago, all free reference libraries, and all founded and maintained from bequests or endowments. They are uniformly of a scholarly character, and tend toward specialization in some one or more department of knowledge.

American Libraries. The first library to be established on American soil was that of Harvard University, founded in 1638, six years after the college, and followed in 1700 by Yale. These two are still among the greatest college libraries in America and, in common with most of their type, admit the educated public more or less freely to their shelves. In 1696 the Rev. Thomas Bray was sent from England to Maryland as superintendent of religious affairs, and introduced a number of small parochial or church libraries into the American colonies as an aid to his work. These were open to the public. The Philadelphia Library was founded as a joint-stock company in 1731 by Benjamin

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Franklin, who tells the story of its inception in his famous autobiography, and who is called the "Father of the Circulating Library." This was a subscription library and circulated books to its members only, but it extended reference privileges to the general public.

The idea of providing books for free use at the expense of the community by means of taxation originated in America. A town library was conducted on this plan in Salisbury, Conn., as early as 1803, and in 1833 the town of Peterborough, N. H., founded a free circulating library, supported by public taxation, which is still in existence. But the history of the modern American public library properly begins with the adoption of laws by the various states authorizing cities, towns and villages to organize public libraries and to levy taxes for their support. Such a law was first adopted by Massachusetts, in 1848.

In the United States the spread of the public library idea has been rapid and extensive. In 1876 an organization of librarians called the American Library Association was formed in Philadelphia which now has over 6,000 members and holds annual conventions. In most of the states, also, and even in some of the larger cities, there are clubs and associations which meet for consideration of professional problems. These associations have been largely instrumental in promoting professional consciousness and coöperation in the creation of a body of doctrine and practical technique which has been crystallized into a uniform and authoritative system called Library Science. Underlying this is the conviction that the public library is an integral part of public education to which every member of the community, young or old, great or humble, lettered or unlettered is equally entitled. Among the most striking departures from former practice is the growing tendency to allow free access to the book shelves. This is called "open access" and has been widely adopted in the administration of American public libraries.

The modern public library, moreover, has ceased to wait for its patrons to seek it out, but employs means and methods for attracting the public which are both enterprising and effective. Branch libraries are installed in residence districts, often in buildings specially designed for this purpose. The New York Public Library, the greatest free circulating library in the world, maintains, besides a magnificent central building, a chain of forty-two branches in separate buildings erected from a gift of $5,200,000 from Andrew Carnegie. Similar branch systems, though not in every case so handsomely housed, form an important part of nearly every large American public library. Brooklyn has twenty-nine branches; Boston, twenty-eight; Philadelphia, twenty-six; Cleveland, forty; Cincinnati, twenty; Pittsburgh, eight; Chicago, thirty-five; Detroit, eleven; Los Angeles, twenty. Branch buildings are arranged upon a generally accepted plan comprising separate reading rooms for adults and for children, with books on open shelves along the walls or in book stacks easily accessible. Frequently they include halls for meetings of neighborhood societies.

In Canada. The province of Ontario has about 400 public libraries, and this number exceeds the total in all the remainder of the Dominion. The largest is the public library of Toronto, but in 1917 Montreal was organizing a library which was expected to equal in size and equipment the one in Toronto. The Montreal institution is the first one of a truly public nature in the province of Quebec. The War of the Nations, which began in 1914, put at an end for several years ambitious projects to organize libraries in many other Canadian cities.

Carnegie Libraries. The name of Andrew Carnegie is inseparably linked with the growth of public libraries in the English-speaking world during the past twenty-five years. Attributing much of his own success to the influence of the books loaned to him by a citizen of Allegheny, Pa., where he lived as a youth, he began his donations by the erection of a public library in that place, following it shortly by the gift of a splendid museum and library building to the city of Pittsburgh. Many other large cities, among them New York, Philadelphia and Saint Louis, have accepted his benefactions, while thousands of smaller places in America and in Great Britain and her colonies bear testimony to his generosity in the public libraries made possible through his aid and, in many cases, bearing his name. Up to the end of 1915 the total amount of his grants to public libraries was nearly $65,000,000. See CARNEGIE, ANDREW.

Librarianship as a Profession. The administration of a modern public library is now recognized as a specialized occupation or profession requiring training, experience and a high degree of executive ability, while the several branches of the work call for special skill, learning and scientific accuracy. One of the

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most intricate of these specialties is that of the classification of books, that is, their grouping by subjects, and the application of some plan of numbering or notation indicating the proper location of each book with reference to all others in the same class.

Several highly ingenious and practical systems of classification have been devised, two of which are in general use in American libraries. The *decimal classification,* compiled by Melvil Dewey, and first published in 1876, is the most widely used. The ninth edition is now extant, and constant revision and addition keeps it abreast of scientific progress. It is based on an arbitrary division of the field of knowledge into ten main classes, capable of indefinite subdivision by means of figures and the decimal point. It possesses elasticity, adaptability and mnemonic qualities rendering it applicable to the largest as well as the smallest collection of books. The *expansive classification,* devised by Charles A. Cutter, is more complex and fuller in its schedules, and is, perhaps, better adapted to the needs of large scholarly collections such as university and reference libraries. Cataloguing is another branch of librarianship which demands a large measure of scholarship, expertness and accuracy. A number of manuals cataloguing rules have been issued, the first American compilation being the *Rules for a Dictionary Catalog,* by Charles A. Cutter, mentioned above, published by the United States Bureau of Education in 1877. Known as "Cutter's Rules," this is still the leading authority and forms the basis for all subsequent American codes.

Librarianship as a profession, in its functions, duties and emoluments, closely parallels that of the teacher, and is enlisting in its ranks a steadily growing number of men and women of high character, ability and education. For women, especially, the opportunities for useful and congenial employment are very promising. In the thousands of small and medium-sized public libraries of America most of the positions, including that of chief librarian, are filled by women. In the largest institutions, and those of special grade, the chief administrative offices are usually occupied by men. There are now ten professional schools for training librarians, the pioneer and still the leading institution being the New York State Library School at Albany. Other schools, usually affiliated with a university or a large library, are the New York Public Library School; Pratt Institute, Brooklyn; Simmons College, Boston; Syracuse (N. Y.) University; Western Reserve Library School, Cleveland; Southern Training School, Atlanta, Ga.; University of Illinois Library School, Urbana, Ill., and Wisconsin State Library School, Madison.

In a number of these schools the completion of a general college course or its equivalent is necessary for admission, while most of the others require at least two years of college work or equivalent educational credits before entrance. Personal qualifications, temperament, disposition and general adaptability of applicants are also taken into account. The course extends over two years, combining theoretical instruction with much practical work in libraries of various kinds. Several of these institutions confer the degree of Bachelor of Library Science. The Carnegie School for Children's Librarians, with a two-year course wholly devoted to that specialty, is conducted as an adjunct to the Carnegie Free Library of Pittsburgh. Entrance requirements are similar to those indicated above.

Library Commissions. Thirty-seven states of the Union now have, as a part of the state government, boards or commissions for the advancement of library interests. These commissions are composed of three or five members serving without pay, and a staff of salaried executives who devote their energies to promoting the establishment of new public libraries, the improvement of conditions in existing libraries, the circulation of traveling libraries in rural communities, maintenance of summer schools (in Wisconsin and Indiana of a fully organized library school) and other measures for the extension and development of library facilities throughout the commonwealth.

National Libraries. The great national libraries of the United States, France and Great Britain are described in the articles LIBRARY OF CONGRESS, BIBLIOTHÈQUE NATIONALE and BRITISH MUSEUM. Other notable national libraries are the Imperial Public Library at Petrograd, the Imperial-Royal Library at Vienna, the royal libraries of Berlin, Munich, Stockholm, Copenhagen, and the Biblioteca Nazionale Centrale at Florence. Record must be made here of the magnificent Library of the Vatican, first in the importance of its contents and sheer wealth of its possessions. Founded in 1447 by Pope Nicholas V, and housed in the most sumptuous library quarters in the world, it contains, besides the secret Papal archives, a staggering profusion of ancient Biblical and classical manuscripts and other book rarities

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such as have not been brought together elsewhere. Its printed books number 250,000 volumes and its manuscripts over 40,000. C.B.R.

See the articles READING and LITERATURE for lists of books suitable for reading by boys and girls and their fathers and mothers and by teachers. For books relating to the subject *Library*, consult *Special-Report on Public Libraries*, issued by the United States Bureau of Education; Adams' *Public Libraries and Popular Education*; Dewey's *Decimal Classification and Relative Index*.

LIBRARY OF CONGRESS, now the third in size among the world's libraries, was established in 1800 in Washington, D. C., and designed for the use of members of the United States Congress. While it is maintained to serve its original purpose, the present use of the building and contents is largely by others than Senators and Representatives. The library was at first housed in a room of the Capitol, but so rapid was the accumulation of material that several times it outgrew enlarged quarters that were there provided; in 1897 it was removed from the Capitol to a special building which was begun in 1889 and completed in eight years at a cost of $6,500,000. The location of the Congressional Library is east of the Capitol; it covers a ground area of nearly four acres, and has more than eight acres of floor space. For the convenience of members of Congress a subway connects the library and the Capitol, and an endless chain system conveys books to and from the halls of legislation.

In 1814, when the Capitol was burned, the library was destroyed. Congress established it anew by the purchase of the library of Thomas Jefferson, comprising 6,760 volumes, for which it paid $23,950. In 1851 fire again destroyed nearly the entire collection, 35,000 volumes being lost. Since then Congress has made regular appropriations for its development. Under the copyright laws since about 1860 the library has received two copies of every publication in the world for which copyright protection in the United States has been requested. It has also received gifts of rare and beautiful books. In 1916 the library comprised over 2,390,000 books and pamphlets, about 30,000 manuscripts, 60,000 charts and maps, almost 400,000 musical compositions and about 100,000 engravings and lithographs.

The library is in charge of the Librarian of Congress, who is appointed by the President and confirmed by the Senate; he receives a salary of $6,500 per year. Under him is a staff of trained officials such as one of the world's greatest libraries requires. The service to the public is in the highest degree efficient, and the routine is much like that employed in any great city library, except it is on a larger scale and that no books or documents may be taken from reference and reading rooms except by members of Congress and government officials. Access by the public to any book published is made easy through intelligent attendants.

The building is the most magnificent structure of the kind in the world, and is unequalled in the United States in beauty of interior decoration. E.D.F.

For details of the world's largest libraries, see BIBLIOTHÈQUE NATIONALE; BRITISH MUSEUM. See, also, the article LIBRARY.

LICENSE, *li'sens,* a formal permission given a person by the proper authority to engage in a business or to do certain things which, without that authority, would be unlawful. In most cases the privilege is granted on the payment of a fee. Licenses are issued principally for the safeguarding of the public rights, for the purpose of obtaining revenue, or for both reasons, and they may be revoked by the proper officials if the terms on which they are granted are not observed. There are many callings which directly affect the health, morals or general welfare of the community, and it is therefore necessary that the state or municipality should regulate the number and qualifications of persons engaged in such callings. For this reason, dentists, physicians, pharmacists, undertakers, school teachers, lawyers, etc., are required to hold licenses in order to carry on their chosen vocations.

Owners of theaters and other places of public amusement, street peddlers and owners of automobiles are also required to procure licenses. Automobiles are a direct source of expense to the community in that they increase materially the wear on public highways, and a license fee upon such vehicles is considered justifiable; such licensing also assists in identification in case of reckless driving which may result in accidents. The granting of saloon licenses has become a matter of widespread public interest. A considerable number of people favor the regulation of this business by means of a *high license,* which tends to restrict the number of saloons. The advocates of *low license* favor a small fee, to be levied for revenue only. Another group, the *prohibitionists,* do not believe it necessary for the government to derive a revenue by licensing saloons, and

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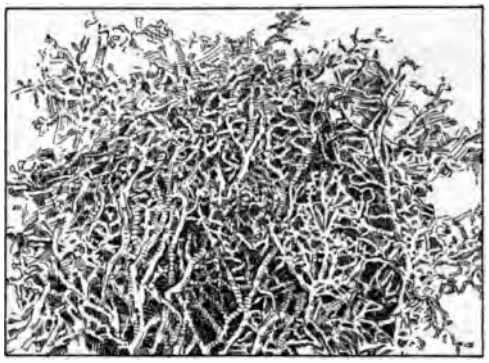
favor the abolition of the liquor traffic. See LOCAL OPTION; PROHIBITION.

LICHENS, *li'kenz,* strange and beautiful flowerless plant formations which, needing no soil, grow on and adorn bare rocks, tree stumps



REINDEER LICHENS

and waste places. They are usually dry, and most of them crumble easily when touched. Ruskin describes them as—

> Meek creatures; the first mercy of the earth, veiling with hushed softness its dustless rocks; creatures full of pity, covering with strange and tender honour the scarred disgrace of time.

Lichens of gray, yellow, brown, greenish, blue or black color are found the world over, from the frozen north to the tropical south, from the beaches to loftiest mountain peaks. Probably 4,000 species have already been described.

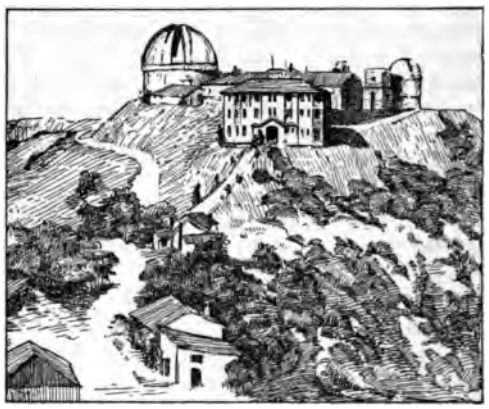
Lichens are combinations of algae and fungi (see ALGAE; FUNGI). In this unique plant-partnership the alga furnishes the food and the fungus protects the alga from the sun's rays and absorbs water for its companion. Lichens have neither roots, stems nor leaves, but have layers of variously-shaped expansions called *thalli.* According to structure they are classed as *foliose,* or leaflike, the kind which creeps over fence-rails; *crustaceous,* or shell-like, the form which paints big rocks with delicate patterns in grays and greens; and *fruticose,* or shrublike, that class which, mosslike, beards trees, or clusters on barren ground.

According to one accepted theory of lichen growth, a fungus spore is carried on the winds and finally lodges on a group of alga cells with which it can live. Both spore and cells continue to grow, thrive and reproduce. Being so constructed that all they need for survival is the moisture they can gather from the air, lichens can thrive where every other form of vegetation must perish.

Uses. Lichens not only make their chosen places of abode more beautiful, but they help pave the way for other forms of life. Growing as they do upon exposed rocks and in barren soil, they secrete an acid which dissolves the rock and softens the soil, and in time when they decay and mix with the soil, they enrich it so that more highly-developed plants can grow there.

Some lichens containing quantities of starch are valuable articles of food for man and beast. Iceland moss and reindeer lichen, which grow abundantly in Northern regions, not only form the principal food for reindeer, but both have been used as food for man. The manna of Scripture is supposed to have been a species of lichen. Some species furnish dyes, one of the best-known of these being the litmus of commerce, so extensively used in chemistry (see LITMUS). Years ago lichens were used as drugs. E.D.F.

LICK OBSERVATORY, an observatory conducted by the department of astronomy of the University of California, is on Mount Hamilton, of the Coast Range, 4,285 feet elevation. The observatory is about twenty-six miles east



LICK OBSERVATORY

of San José and was completed in 1888. It was named for James Lick, a California millionaire, who left the sum of $700,000 for its erection and equipment (see below). The telescope is the second largest one in the world, with a refracting lens of thirty-six inches and a focal length of over fifty-six feet. It is only surpassed by the forty-inch telescope of the Yerkes Observatory at Lake Geneva, near Chicago. The dome and observation platform are moved by water power, and the telescope tube has a point of suspension thirty-six feet from the floor. Among its modern appliances

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is an intricate device for recording earthquake disturbances.

The site was selected on account of its clear atmosphere, and here many notable eclipses have been observed. In 1892 at Lick the fifth moon of Jupiter was discovered by Barnard, and a search for new stars and comets is systematically prosecuted. Visitors are freely admitted, and methods of work are explained, and in this way an impetus is given to popular education.

James Lick (1796-1876), an American capitalist who founded the observatory that bears his name, was born in Fredericksburg, Lebanon County, Pa. He became a manufacturer of pianos in Philadelphia, and from 1821 to 1847 was in the same business in Valparaiso and Buenos Aires in South America. In 1847 he settled in California, invested largely in real estate, and accumulated a vast fortune. In 1874 he placed the sum of $3,000,000 from his estate in the hands of seven trustees to be devoted to charitable and specified uses, and a year later he increased the amount to $5,000,000. His principal bequest was to the University of California for the erection of an observatory which was to contain the world's most powerful telescope at that time. A large sum was also appropriated for three groups of statuary to be placed before the city hall in San Francisco to represent three important periods in the history of California.

LICORICE, or **LIQUORICE,** *lik'oris,* a hardy herb of the pulse family, which grows about four feet high and bears long, sweet roots that give it great commercial value. It is found in Southern Europe and Asia. Licorice grows wild in damp places, and is usually regarded by ignorant natives as a worthless weed. By pressing the root, a thin, yellow fluid is obtained which is used in medicine, especially in the treatment of bronchial troubles. The commercial article is made by evaporation of the extract which is boiled from the roots. The Syrians make a business of pulling, drying and packing licorice. The roots grow from two to three feet long and are pulled in the damp season in October, left stacked to dry for nearly a year, then pressed into bales for export. Licorice is used to add flavor to port wine and tobacco, also in the manufacture of beer and in making cough drops, candy and chewing gum.

LICTORS, *lik'torz,* in ancient Rome, the official attendants who were appointed to enforce due respect for the chief magistrates and fulfil the commands of the latter. The number of lictors depended on the magistrate's rank. A dictator, when appearing in public, was preceded by twenty-four lictors; a consul by twelve, a propraetor by six, and a praetor by two. The lictors carried axes tied in bundles of rods called *fasces,* as an ensign of office. The duty also devolved on the lictors of inflicting punishment on Roman citizens who had been condemned. In later times fasces were carried before the emperor. See FASCES.

A LICTOR

LIEBIG, *le'biK,* JUSTUS, Baron von (1803-1873), one of the most celebrated chemists of the nineteenth century, regarded as the founder of organic chemistry. His *Chemistry of Food* brought about a more rational method of preparing and using food, and his application of chemical principles to soils and manures greatly advanced the science of agriculture.

He was born in Darmstadt, Germany. His paper on *Fulminic Acid,* written while he was studying in Paris, attracted the attention of Alexander von Humboldt and led to his appointment as professor of chemistry at Giessen, where he labored for more than a quarter of a century. He was raised to the rank of baron by the Duke of Hesse, and other honors were heaped upon him. He became professor in the University of Munich in 1852, and in 1880 was appointed president of the Munich Academy of Sciences.

Liebig labored successfully in all branches of chemistry, but particularly in organic chemistry, making many discoveries in that department and doing much toward improving the

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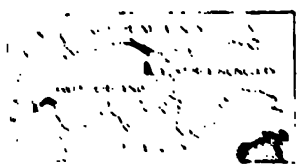
methods of analysis. His *Chemical Letters*, published in 1852, have been translated into nearly a dozen languages and are among the most valuable contributions to chemical literature written in modern times.

LIECHTENSTEIN, *lēk'ten-shtīn*, the smallest independent state in Europe, with the exceptions of Monaco and San Marino. It lies between Austria and Switzerland, extending along the right bank of the Rhine, and covers an area of about sixty-five square miles, a little greater than that of the District of Columbia, but a third of that of the city of Chicago. The surface is mountainous, the soil is fertile, and the climate is healthy. The principal industries are agriculture, stock raising, weaving, wood carving, and wine making.



LOCATION MAP

The government is a monarchy, hereditary in the male heirs of Landgrave [illegible]. The government is [illegible]. The Diet, or Parliament, is composed of [illegible] members, elected by universal suffrage [illegible]. The Diet has no power over the [illegible]. The Diet has no power over the [illegible]. The Diet has no power over the

a *lieutenant-commander* is next to a nder and ranks with a major; a *senior ant,* the next in grade, ranks with an :aptain; a *junior lieutenant* ranks with y lieutenant.

:anadian and American armies a *lieu-colonel* is below a colonel and above a The grade of lieutenant-general usually n the United States only in war time.

he United States army the pay of a ant-colonel ranges from $3,500 to $4,500 :, the maximum being reached after years of service; that of the first lieu- ranges from $2,000 to $2,800, and of the lieutenant, from $1,700 to $2,380. In ry lieutenant-commanders on shore duty from $3,000 to $4,000 a year, and those from $3,300 to $4,400. Senior lieuten- ave corresponding salaries ranging from to $3,360; and from $2,640 to $3,696. lieutenants receive from $2,000 to $2,800 on shore duty, and from $2,200 to $3,080 t sea. See RANK IN ARMY AND NAVY.

ITENANT-GOVERNOR, in Canada, the ve head of a province, and the direct ntative of the Crown in provincial gov- it. He is not elected by the voters, as e governors of states in the American but is appointed by the Governor-Gen- Council. He has, therefore, the double er of an officer of the Dominion as well he province, just as the Governor-Gen- an officer of the Crown and of the ion. In his official acts the lieutenant- or follows the rules and usages which the relations of the Governor-General s advisers. He appoints his executive , or Ministry, and is guided by their so long as they retain the confidence of islature. He summons, prorogues (that ourns) and dissolves the legislature, appointments to office, and generally ns all executive acts necessary for the ment of the province. He usually serves years, but he is subject to removal by overnor-General for "cause assigned," means that the reason must be given to ominion Parliament. In Ontario and the lieutenant-governor receives a sal- $10,000 a year; in Prince Edward Island, in each of the remaining provinces,

he United States. The lieutenant-gov- of a state of the Union occupies a posi- nalogous to that of the Vice-President United States. He presides over the state senate, and succeeds to the office of gov- ernor in case of the death or permanent dis- ability of the latter. During temporary disa- bility or absence of the governor from the state he becomes acting governor.

LIFE EXTENSION. There lived in Venice five hundred years ago a Count named Cor- naro. Although during his life few people realized that he was remarkable, now, five centuries later, we know that he was in his way a great man. His fame will probably live forever. Cornaro was born a nobleman in rank. But this does not mean that he was what might be termed a nobleman in body. As a child he was sickly. He suffered ill health all during his early manhood, and before he was forty the doctors gave him up to die.

But Cornaro was really a nobleman in men- tality and character, and when he found him- self at so young an age facing the end of his life, having in no degree attained his manly ambitions, he began to meditate, sick as he was, upon the nature of his condition. Out of that meditation Cornaro evolved a new sense of how to live, and we who are born in the twentieth century are still reaping the benefit of Cornaro's discoveries. Instead of dying at forty, Cornaro, as a result of his discoveries regarding the rules of hygienic living, and because of the force of his will and character in putting them into effect, extended his life to the century mark. He did not simply ex- tend, for sixty years, his feeble life of forty. He converted that life—of a "despairing and helpless invalid, unfit for either work or en- enjoyment"—into a healthy, happy and pros- perous one. He attained mildness and swect- ness of disposition, gaining thereby respect and affection, and he retained his rugged health and vigor and the full possession of his mental faculties until the end of his remarkable career.

The principles of hygiene by which Cornaro so extended his life often have been re-discov- ered by modern science, and since Cornaro's time there have been many famous examples of life extension—which does not mean adding a few years to feeble old age, but adding to the years of youth and strength and postponing the years of senility—if indeed the years of comparative youth cannot be retained to the end. This means, of course, that life length- ened is broadened, in usefulness and enjoy- ment.

Since, however, "what is one man's meat is another man's poison," it is always advisable to have a periodic medical survey made of the

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entire body, in order to ascertain the strength and weakness of special organs and obtain an intelligent basis of procedure in hygienic living; for all are not constituted alike, and indeed many are carrying about physical defects which require special action and consideration.

Few people realize the great extent to which such physical defects and impairments exist and the importance of discovering them at as early an age as possible. The work of the Life Extension Institute, Inc., of New York City, among thousands of individuals, ranging from infants to aged men and women, has revealed the fact that the health of hardly any individual is perfect, and that even some young boys and girls already show conditions which should exist only in old people. The importance, therefore, of beginning these periodic medical inspections at the earliest possible age, so that beginning defects and impairments may be detected and checked at once, if possible, can hardly be over-emphasized. The following table shows the percentage of impairments found in a group of especially well-cared for young men and young women:

ANALYSIS OF PHYSICAL EXAMINATION OF 1,000 INDUSTRIAL WORKERS (FOREMEN AND SKILLED WORKERS) IN A LARGE DETROIT MOTOR COMPANY, AND COMPARISON WITH THE RESULTS OF 1,000 EXAMINATIONS OF EMPLOYEES OF BANKS, TRUST COMPANIES, AND COMMERCIAL HOUSES IN NEW YORK CITY.

	Detroit Motor Co. industrial	*New York commercial.*
Employees	1,000	1,000
Average age ..... years	32.7	27
Perfect on examination. No physical impairment found, and no advice for correction of living habits needed ..... per cent.	00	1
Imperfect on examination. Advice needed regarding physical condition or living habits ..... per cent.	100	99
Advised to seek medical treatment ..... per cent.	69	81

(Of those referred to physician, there were aware of impairment in each group only about 10 per cent.)

Those found imperfect, either in physical condition or manner of living, were classified as follows: (These percentages refer to individuals, and are of the total number examined.)

	Per cent.	Per cent.
Minor.—		
Advice needed regarding living habits or physical condition, but immediate treatment not required	31.1	17.7
Moderately impaired.—		
Referred to physician for treatment and report sent to physician	22.9	18.5
No physician, or none mentioned. Urged to seek medical treatment or guidance	39.9	58
Seriously impaired.—		
Referred to physician for treatment and report sent to physician	3.6	2
No physician or none given. Urged to seek medical treatment	2.5	2.8

ANALYSIS OF IMPAIRMENTS.

These percentages are of the total number examined. As many had several impairments, the total of the percentages exceeds 100. In other words, these percentages are not mutually exclusive, but overlap.

	Per cent.	Per cent.
Moderate to serious.—		
Organic heart	3.5[1]	16.2
Moderately to serious thickened arteries (radials, brachials, and others)	24.65	42.4[2]
Slightly thickened arteries (chiefly radials)	29	
High or low blood pressure	23.1	26
Urinary—albumin, sugar, casts	45.6[3]	39.8
Combined urinary and other serious impairments	26.6	24
Total urinary and circulatory impairments	72.3	
Nervous	.3	1.1
Lungs	5.7	2.9
Minor to moderate.—		
Functional circulatory — rapid, slow, irregular pulse	21.6	14.8
Minor urinary — indican, bile, crystals, etc.	26.6	20.8
Digestive disturbances	9	7.3
Constipation	14.7	17.2
Nose, throat, respiratory	42	28.5
Ears	30.3	20.3
[5]Teeth and gums	69.5	47.8
Anemia	.4	2.7
Skin	6.8	9.1
Errors in diet	54.1	59.8
Errors in personal hygiene	50.5	54
Physical defects:—		
Faulty vision, not fully corrected	41	31.1
Flat foot	2.3	4.3
Faulty posture	18.1	17.7
Rupture, no truss	2.4	1.8
Overweight (25 per cent.)	12.8	3.2
Underweight (25 per cent.)	7.7	15.1
Unclassified	16.5	10.1

[1]These men had previously been examined before employment for gross heart defects.

[2]This figure represents all grades of thickening. No subdivision was then attempted in classification.

[3]These men were taken right from their work and examined during the heated term in July, which may possibly account for this high percentage.

[5]Teeth	14.27 per cent.
Gums	14.07 per cent.
Both	41.01 per cent.

Cornaro's principles of hygiene, and the more extended discoveries of modern science, are easily adoptable by every boy and girl, every man and woman. These principles involve no irksome burdens, and no sacrifices; they are the simple natural methods of availing one's self of the greatest source of enjoyment. Through their adoption every young man and young woman may become a "noble" in a physical and moral sense.

These principles of hygienic living, in order to make them practicable for everyday use, have been formulated by the Life Extension Institute, Inc., into fifteen simple rules (see *How to Live,* Funk and Wagnalls Company, New York and London), which are given below in brief elaboration:

1. Ventilate every room you occupy.

It is certainly more pleasurable to live in a room in which the air is fresh and sweet, like out-door air, than in a stuffy, close atmosphere. To be sure, old-fashioned people did not seem to

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be particularly clever about availing themselves of such pleasures. In some country homes the windows were nailed down to prevent fresh air from entering. Modern men and women, however, will not be denied the blessings of pure, sweet air, and have devised methods of obtaining it inside their houses, winter and summer, without any attending discomforts.

The use of window boards is one method. A window board three or four inches high which stands on the edge of the window sill deflects the incoming air upwards, so that it may reach the breathing zone, instead of simply flowing on to the floor and chilling the feet. Any enterprising boy can make one of these window boards and perhaps save his whole family from sickness during the winter.

After fresh air enters the house, it should be kept fresh. For one thing, it must be kept free from dust. This should be removed from the floor and furniture, not by the old-fashioned feather duster and the broóm, which scatter the dust into the air, but by a damp or oiled cloth. Dust-catching furniture or hangings are not hygienic. A carpet sweeper is more hygienic than a broom, and a vacuum cleaner is better than a carpet sweeper. The removable rug is an improvement over the fixed carpet. Dust should be removed not only because it is harmful in itself, but because it is a vehicle for the carrying about of harmful bacteria.

A very common and at the same time injurious form of air vitiation is that from tobacco smoke. Smoking, especially in a closed space such as a smoking room or smoking car, vitiates the air very seriously for smoker and non-smoker alike.

The best way to keep air fresh is to have it constantly renewed. It is well to have an entrance for fresh air and an exit for used air, bringing about a constant circulation. Where there cannot be such a cross-current some circulation can be secured by having a window open top and bottom. Air fans are also useful for keeping the air from getting stagnant, especially in summer.

Drafts are not necessarily the evil things which many people think them. A gentle draft, as a matter of fact, is one of the best friends which the seeker after health can have. Of course a strong draft directed against some exposed part of the body, causing a local chill for a prolonged time, is not desirable; but a gentle draft, such as ordinarily occurs in good ventilation, is extremely wholesome.

It goes without saying that persons unaccustomed to good ventilation, and consequently oversensitive to drafts, should avoid overexposure while they are in the process of changing their clothing. But after even a few days of enjoyment of free-moving air, with cautious exposure to it, the likelihood of colds is greatly diminished. Persons who continue to make friends with moving air soon become almost immune to colds. Army men have often noted that as soon as they are on the march and sleep outdoors, they seldom or never have colds, but they develop them as soon as they get indoors again.

In every household there should be an accurate thermometer. It should be someone's duty to watch that thermometer from time to time, and not permit the temperature to rise above 70 degrees; preferably it should be kept between sixty-five and sixty-eight degrees. The average individual is overdressed, during the winter time, for a house temperature of seventy degrees. With windows closed and usually no adequate and constant means of ventilation, the air is stagnant and overheated, and the skin- and surface-circulation of the blood is rendered oversensitive to the sudden and extreme changes of temperature so common in temperate climates.

2. Wear light, loose and porous clothes.

A truly healthy body is not the waxy-white which is so common, but one which glows with color, just as do healthy cheeks exposed to open air. Clothing, therefore, must allow of ventilation, namely, such as will allow free access of air to the skin, requires that our outer clothes—including women's gowns and men's shirts, vests, vest-linings and coat-linings—should also be loose and porous. Most linings and many fabrics used in outer clothes are so tightly woven as to be impervious to air, yet porous fabrics are always available, including porous alpacas for linings. To test a fabric it is only necessary to place it over the mouth and observe whether it is possible or easy to blow the breath through it.

Exercising in cool air—not too cool—with clothing removed, is an excellent means of hardening the skin and of promoting good digestion.

The constriction from rigid and tight corsets, belts, tight neckwear, garters, etc., interferes with the normal functions of the organs which they cover. All such constriction should be carefully avoided. The tight hats generally worn by men check the circulation in the scalp. Tight shoes, with extremely high heels, deform the feet and interfere with their health. Several anatomical types of shoes, that is, shoes made to fit the normal foot instead of to force the foot to fit them, are now available. In all except cold weather, low shoes are preferable to high shoes. When possible, sandals, now fortunately coming into fashion, are preferable to shoes, especially in early childhood; but the adult, whose calf muscles and foot-structure are not often adapted to such footgear, must be cautious in their use, lest flat-foot results.

Only the minimum amount of clothing that will secure warmth should be worn. Woolens protect most, but they require the least exercise of the temperature-regulating apparatus of the body. While wool is also highly absorbent of moisture, it does not give off that moisture quickly enough. Hence, if worn next the skin, it becomes saturated with perspiration, which it long retains, to the disadvantage of the skin. Consequently, woolen clothing is best confined to overcoats and outer garments, designed especially for cold weather. The underclothes should be made of some better conducting and more quickly drying material, such as cotton or linen. In winter light linen-mesh, and medium wool over that, or "double-deck" linen and wool underclothes can be worn by those who object to either linen or wool alone.

Those who have learned to clothe themselves properly find that they have grown far more independent of changing weather conditions. They do not suffer greatly from extreme summer

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heat nor extreme winter cold. Especially do they note that "raw," or damp, cold days no longer tax their strength.

3. Seek out-of-door occupations and recreations.

Those who spend much of their lives in the open enjoy the best health and greatest longevity. Climate of itself is a secondary consideration. Not every man can choose the best climate in the world. The main advantages of fresh air can be enjoyed in almost any climate. Even in a city, outdoor air is, under ordinary circumstances, wonderfully invigorating. The common prejudice against damp air greatly exaggerates its evils. While moderate dryness of air is advantageous, it seems nevertheless true that to live in damp, even foggy, air out-of-doors is, in general, more healthful than to live shut up indoors.

Observations have shown that the pupils in outdoor and open-window schools are not only kept more healthy but learn more quickly than those in the ordinary schools. Parents should insist on fresh air for their children when at school. For themselves, also, they should not neglect fresh air; they should attend outings and picnics, and take visits to parks. Whenever there is a choice in the matter, outdoor recreation should be given preference to indoor.

Outdoor occupations should also be chosen when possible in preference to indoor ones—such as working on a farm rather than in a factory. Leaving the country for the city is often disastrous, even for the purpose in view, namely, to gain wealth; for wealth gained at the expense of health always proves in the end a bitter joke. The victim proceeds, through the rest of his life, to spend wealth in pursuit of health. This does not mean, however, that it is not perfectly possible to keep well in the city, provided care is taken to obviate the city's hygienic disadvantages.

4. Sleep out, if you can.

It is the universal testimony of those who have slept out-of-doors that the best ventilated sleeping room is far inferior in healthfulness to an outdoor sleeping porch, or to an open tent, or to a window tent (large enough to include the whole bed). For generations, outdoor sleeping has occasionally been used as a health measure in certain favorable climates and seasons. But only in the last two decades has it been used in ordinary climates and all the year round. To-day many residences are built with outdoor sleeping porches.

Outdoor sleeping increases the power to resist disease, especially the disease of tuberculosis, and greatly promotes physical vigor, endurance and working power. Many people are deterred from sleeping out by a mistaken fear of night air and the malaria which they imagine this dreaded night air may bring. To-day we know that malaria is communicated by the bite of the anopheles mosquito and never by the air (see MOSQUITO). The moral of this is not to shut out the night air, but to shut out the mosquito by screens. It is very important, in any sleeping balcony to be protected from the wind in winter, and care must be taken to dress warmly, to have plenty of bed-clothes, a thick mattress, and to keep the bed dry.

When a sleeping porch is not available, an inward window tent can always be had, which puts the sleeper practically out-of-doors and at the same time cuts off his tent from the rest of the room.

5. Breathe deeply.

Breathing exercises should be deep, slow, rhythmic and through the nose, not through the mouth. There have been famous examples of restoration to health simply by the use of this measure.

Muscular exercises stimulate deep breathing, and in general the two should go together. But deep breathing by itself is also beneficial, if very slow. Forced rapid breathing is comparatively valueless, and indeed may be positively harmful. Oxygen is absorbed only according to the demand for it in the body, and not according to the supply.

Singing requires deep breathing, and is, for that and other reasons, an excellent hygienic practice.

6. Avoid overeating and overweight.

Everything we eat is not food. How much we should eat depends upon what we eat. The amount of food in different eatables varies widely. A third of an ounce of olive oil is as much food as a whole pound of tomatoes, or of celery, lettuce, cucumbers, string beans, asparagus or watermelon.

What to eat depends somewhat upon one's weight. Many people are too fat because they eat too much food. Sometimes they think they are "small eaters," for most people measure food by its bulk. The fact may be that while one is taking a moderate amount of bulk, one may be selecting, to make up that bulk, things very high in food value, so that in reality one is eating much more food than is needed, and the body is storing it up in fat. Fatness is not a desirable condition for the health. Even a slight degree of overweight is a disadvantage. After the age of thirty-five those slightly under the average weight show the lowest death rate.

Anyone who is overweight should shun the things of high food value, and should fill the stomach only with things of low food value, such as green salads (leaving out the oil in the dressing), and such vegetables as cabbage, turnips, parsnips, spinach, asparagus, etc. An overweight should not eat a lot of bread and butter, cereals, oil, cream or sweet things. Raw fruits (except bananas) should be used freely. Such a person should be particular to avoid munching candy, nuts, peanuts, popcorn and such things, between meals, and he should not drink with meals, although of course everyone, fat or thin, should remember to take some water between meals. Underweights can indulge more freely in the things tabooed for overweights. It is never wise, however, to eat more than one can digest, even for the purpose of gaining weight. "A lean horse for a long race" is a good motto, if the leanness is not due to anemia or other disease and is accompanied by a sense of well-being.

7. Eat sparingly of meat and eggs.

Meat and eggs are particularly high in food value, in relation to their bulk. It is wise, there-

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fore, to mix these foods with vegetables, green salads and fruits, to bring down the average food value for the total bulk needed, and to furnish fruit and vegetable acids, minerals, etc. The stomach should be comfortably filled, not overloaded. But its contents should be made up of things not too high in food value. The mistake which is generally made is of filling the stomach with things too high, such as meat, fish, eggs, rich desserts, cream, candy, etc.

It is well to have a printed table of food values to which to refer for authoritative information regarding what things have lots of food in them, for their bulk, and what ones have not. It is easy enough to remember, however, that all meats and eggs are high in food value, that among the vegetables peas and beans are high, that pure fats are high and sugar is high. These should never be taken in large quantities by themselves, but should be mixed with other foods of lesser nutritive value, such as potatoes, turnips, cabbage, spinach, lettuce, tomatoes, celery, fruits, etc.

The most expensive foods are by no means the best to eat. Among the best foods for most people are fruits, potatoes and other vegetables, nuts (if well chewed), green things, cereals and milk. These are among the cheapest foods. Putrefactive cheese, sweetbreads, liver, kidneys, oysters and "high" game and poultry are not so good for us, and most of them are rather expensive.

There are mainly three kinds of food, called *protein, fat* and *carbohydrate*. Protein food is what we get from lean meat or fish and the white of egg. Fat food is what we get from butter, oil, nuts and fat meats. Carbohydrate food is what we get from bread, cereals, rice, sugars, potatoes and fruits.

Protein food repairs the structure of the body. Fats and carbohydrates furnish the energy. Protein corresponds to the iron with which a stove is repaired, while fat and carbohydrates correspond to the fuel which is burned in the stove. We need in protein only ten per cent of the food value of what we eat; that is all that is required to replenish worn tissues, even in the most active people. The remainder of the food should be in fat and carbohydrates, the latter twice as much as the former.

That is why we should eat sparingly of meat and eggs, lest we get more protein than we need and it becomes a burden to the body. This excess has to be used as fuel, and it is not as good fuel as other kinds of food. Also, protein foods decay rapidly, and decayed food in the intestines causes several kinds of damage. It causes fatigue and various illnesses and burdens the liver and kidneys, which are the organs whose duty it is to eliminate poisons.

8. Eat some hard, some bulky, some raw foods.

It is a good idea to include some hard foods in the dietary, such as crusts, toast, hard crackers, hard nuts, and fibrous vegetables. They make it necessary to chew, which is good for the teeth and gums, and for the digestion. The most of us do not chew enough.

While we need a certain amount of food, we also need a certain amount of bulk, regardless of its food value. This is one of the reasons why we cannot subsist entirely on very fat or very sweet things, for they have a great deal of food value in little bulk, and bulk is needed to keep the intestines moving; also, they lack certain mineral elements and certain substances called vitamines, which do not furnish fuel or energy but are needed to keep our tissues healthy.

Certain elements that the body needs are lost from some foods when they are cooked. So it is well for the average person to eat some raw foods every day—fruits, nuts, milk, salads, etc.

9. Eat slowly.

Whether it be from lack of hard foods requiring prolonged chewing, or from the nervous hurry of modern life, or from other causes, it is undoubtedly a fact that most people eat too rapidly. The correction of this habit will go far toward reforming an individual's diet in every way. Thorough mastication means masticating up to the point of involuntary swallowing. It does not mean forcibly holding the food in the mouth, counting the chews and otherwise making a bore of eating. It merely means giving up the habit of forcing food down, and applies to all foods, even to liquid foods, which should be sipped.

The habit of insufficient mastication is subtle, because it has become second nature to most of us. To free ourselves of it we must first of all allow plenty of time for our meals and rid our minds of the thought of hurry. A boy's school in which the principal is endeavoring to fight the habit of food-bolting has wisely ordained that no boy may leave the dining room until a certain hour, even if he has finished eating long before. In this way the boy soon learns that there is nothing to be gained by fast eating and that the pleasantest way of spending the mealtime is by prolonging the relish of the food. It would be well if all of us would adopt a similar rule for ourselves.

10. Evacuate thoroughly, regularly and frequently.

The sewage channel of the body is not always efficient in releasing its wastes. This condition of stagnation, or sluggish movement which we call *constipation*, is so common that it is accepted by most people as an inseparable feature of so-called civilized existence. The condition of constipation is not only an important factor in reducing the general level of health, but it is, in itself, often an index of lowered bodily vitality.

The causes of constipation are manifold, but may be grouped under the general cause of improper living habits. Heredity plays some part, as many people are poorly endowed at birth as regards their muscular and nervous systems. Left to drift for themselves, they naturally develop bowel weakness and inefficiency. Proper physical care and training in early life can transform many of these cases and protect them in later life. A prominent cause of constipation is the use of laxatives and purgatives. It is so much easier to take a pill or glass of mineral water than to study one's diet and properly modify it that the individual takes the course of least resistance, with the result that the bowels become tired out through continually being whipped and spurred, and finally absolutely refuse to move unless so whipped and spurred. Many purga-

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tives, even those commonly considered harmless, such as laxative salts and mineral waters, are often very distinctly harmful, causing a chronic inflammatory condition of the bowels or aggravating the already existing inflammation that is present in certain types of constipation.

The chief error in diet that induces constipation is the use of concentrated food. Such food leaves little residue or waste to stimulate the bowel movement. Another dietetic error is the use of white flour and of grains that have been deprived of their shell or coating. A meat and potato and white-bread diet is ideal for inducing constipation. Lack of "roughage," or coarse vegetables, and of fruit, is harmful, in that it deprives the bowels of stimulus and the body of elements necessary to health that are found in certain vegetables, in the skin of cereals and in fresh fruit.

The average uncomplicated case of constipation will yield readily to the regulation of diet along very simple lines. Water should be taken sparingly at meals, but quite freely between meals, as well as early in the morning. Fruit and fruit juices are laxative and helpful. A couple of apples eaten in the evening will often prove effective. Other desirable fruits are citrous fruits, figs, dates and prunes. The use of Graham or whole-wheat or corn bread and whole cereals is important. The amount of meat taken should be strictly limited—not more than once daily. But such vegetables as peas, beans, lettuce, parsnips, carrots, turnips, celery, oyster plant, cabbage, Brussels sprouts, tomatoes, salsify, Spanish onions, asparagus and spinach should be freely taken. Liberal portions of at least two of these vegetables should be taken at luncheon and dinner.

Always, however, the digestive capacity and personal peculiarities of the individual should be taken into consideration. In some cases certain vegetables disagree, and a diet containing "roughage" is not well borne, especially if the dietetic habits are suddenly changed. There are few people, however, who cannot take fruit, whole cereals and Graham bread. In lieu of bulky vegetables, purified agar-agar, a Japanese seaweed, may be taken in teaspoonful doses two or three times a day, mixed with cereals or other food, as it is tasteless and inert. This preparation adds to the mass in the intestines and gives the bulk necessary to bring about activity in the bowels. It is not a drug, and has no habit-forming dangers.

Another preparation now much used is mineral oil. This oil is not absorbed or digested, but passes through the bowels and softens their contents, so that they are able to slip through more rapidly. It has no drug effects, and hence is not open to the objections that obtain against ordinary purgatives. Sterilized bran is another preparation that is useful in cases of constipation. It may be taken in cereals, in equal parts, or made into biscuits with one part bran and two parts flour. When used in this way the bran should be carefully sifted, to remove all foreign substances, and then sterilized by boiling or baking.

In cases where there is any question of relaxed or fallen bowels, which is often the case in thin and anemic people who show bad posture, exercise on an inclined plane, such as an ironing board tilted up at one end, is helpful in restoring a normal position of the bowels and improving the abdominal muscles. Lack of regular attention to the bowel function is perhaps the most common cause of constipation. Under a normal physiological diet, the bowels should move after each meal. It is probably seldom that one hasty movement a day thoroughly evacuates the large bowel. A sufficient time should be given for a thorough evacuation.

11. Stand, sit and walk erect.

To set the shoulders back and square them evenly, to keep the chest high well arched forward, the stomach in and the neck perpendicular, like a column, and the chin in, are simple fundamental principles that most people know and many people disregard. Whether sitting, standing or walking, these principles, involving a correct and pleasing carriage and a healthful relation of the organs and structures of the body, should be observed by both men and women.

In walking, the most common error is to slump, with the shoulders rounded, the stomach thrust out, the head thrust forward, chin up and the arms hanging in front of the body. This is a slump characteristic of those with weak muscular and nervous systems. It has even been held that neurasthenia, nervous prostration and mental despondency can be caused by faulty posture, through its effects upon the relation of organs and the circulation of the blood. However that may be, there is no doubt that a drooping posture aggravates the condition of neurasthenia and the various forms of displacement of the stomach and abdominal organs, and that the correction of faulty posture aids in the cure of these conditions. Special exercises are beneficial in correcting faulty posture. See NEURASTHENIA.

It is not enough to have a correct carriage and a well-poised head. We must have well-directed feet. Weak feet are gradually converted into flat feet by faulty standing and walking posture. Toeing out, whether walking or standing, so commonly noted among girls and women, places a certain strain upon the arches of the foot. The correction of this fault by persistent toeing in, Indian fashion, and daily exercise of the leg muscles (rising on the toes twenty or forty times night and morning), will do much to prevent flat foot. When standing, do not keep the heels together and toes out, the ordinary attitude prescribed by athletic manuals as the military attitude of "attention," but keep the heels apart, like the military attitude "at rest," with toes straight forward, the sides of the feet forming two sides of a square. This attitude gives stability and poise and insures a proper distribution of the weight of the body upon the structures of the feet.

Those who stand a great deal should avoid distorted positions, such as resting on one foot and sagging to one side. The body weight should be kept evenly supported on both feet. When the condition of flat foot is found, it should be first considered by a physician or a surgeon, before it is treated by a shoemaker. The ordinary arches supplied by shoemakers, do not cure flat foot.

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Shoes for such feet should be made to order, and have a straight internal edge. All such measures must be supplemented by proper exercise and the correction of faulty position of the feet while standing.

In sitting at a desk or table, when reading or working, the common fault is to adopt a sprawling attitude, with the shoulders hunched up, the elbows stretched outward and the body too far away from the desk or table, and the weight resting on the buttocks. Very often the desk or table is too high, thus causing a continuous strain on the structures around the shoulder joints. Pains, erroneously ascribed to rheumatism, or sciatica, are often due to this faulty posture. To correct this fault, use if possible a chair with a back that curves forward. Sit well back in the chair, but close to the desk, so that the fleshy inner part of the forearms may rest easily upon its surface without pushing up the shoulders. When it is necessary to lean over a desk, acquire the habit of inclining the body forward by bending at the hips and not by distorting the thorax or chest. The arms should hang easily from the shoulders, and the elbows should not rest upon the table. The shoulders should be evenly square, as in the correct standing posture. In right-handed people, the light should fall over the left shoulder or directly from above. The body should rest upon the full length of the thighs, not solely on the buttocks, and the feet (not legs) should be crossed and resting lightly on the ground on their outer edges.

In children faulty posture may mar the future of the individual by causing spinal curvature and physical deformities that interfere with the physical and mental efficiency throughout life, and often lower the resistance to disease. Deep breathing through the nose and setting-up exercises are of incalculable importance in such cases.

12. Do not allow poisons and infections to enter the body.

Among the poisons which must be kept out of the body should be mentioned habit-forming drugs, such as opium, morphine, cocaine, heroin, chloral, acetanilid, alcohol, caffein and nicotine. The best rule for those who wish to attain the highest physical and mental efficiency is total abstinence from all substances which contain poisons, including spirits, wine, beer, tobacco, many much-advertised patent drinks served at soda-water fountains, most patent medicines, and even coffee and tea. Many so-called "patent," or proprietary, medicines contain habit-forming drugs, especially morphine, coal-tar preparations, caffein and alcohol, and depend largely for their sale upon the effects of these harmful substances. Harmful preservatives and adulterants in foods, such as saccharin, should also be avoided.

Scientific experiments have resulted in the interesting discovery that the alleged "strength" obtained from beer, ales and all intoxicating beverages is a delusion. The poison simply gives a temporary feeling of greater strength through paralysis of the sense of fatigue. But the strength does not exist. On the contrary, the user of alcohol in excess is weaker after taking it. Special classes of workmen have been tested as to their efficiency under liquor in small amounts and without it entirely, and it was invariably found that the liquor was a handicap, but that, also invariably, the workmen thought they could work harder by its aid. Alcohol numbs the sense of fatigue and so deceives the user. It is not a stimulant, but a narcotic. The habit of taking a cocktail before meals is harmful.

It is well known that people who indulge in alcohol show less resistance to infectious diseases than abstemious individuals. The paralysis of the white blood-corpuscles is one of the strong arguments against the use of alcohol. The experience of life insurance companies has clearly shown that even the moderate drinker has a shorter life than the man who does not drink at all. Over seventy insurance companies in America have proved that the man who drinks two glasses of beer a day or one glass of whisky is eighteen per cent less desirable a risk than the total abstainer.

The evils of tobacco are not so well understood as are those of alcohol, but every athletic trainer observes that the use of tobacco lessens physical fitness. The ordinary smoker is unconscious of this, and often denies it. At Yale, at Amherst and at the University of Utah, studies of the condition of smokers and non-smokers have been made which show a great advantage on the side of the non-smokers.

The infections of common colds are always to be found in the nasal passages, and become active when the individual is subject to fatigue or indigestion or both. The liability of catching cold is greater when the mucous lining is injured. Nasal douches are injurious and impair the protective ability of the mucous membrane. They should be used only on prescription.

The germ of tuberculosis is probably conveyed oftenest through the sputum of consumptives, which has been allowed to dry, has become pulverized, and is breathed into the system. All sputum should be burned. It is well to avoid rooms occupied by consumptives who are not careful with their sputum.

Suitable wire netting will guard us from malaria and yellow fever, the infections brought by mosquitoes and flies. "A yard of screen in the window is better than a yard of crepe on the door." The greatest triumph in connection with the building of the Panama Canal was not the engineering but the reduction in the death rate among the workers, which, on account of these insect-borne diseases, had previously prevented the successful execution of the undertaking.

We take in many diseases through our food and drink. To elude the typhoid germ, we need first of all pure water. When one is in doubt as to the purity of water, it is advisable to boil it. Another measure for avoiding typhoid is to pasteurize milk. In protecting the food against all kinds of impurities which injure the body, we must remember that the carrier of typhoid fever, the common house-fly, deposits typhoid germs on the food, through which the germ is taken into the system. The most effective method of fighting flies is by preventing their breeding. Their favorite places for this are horse manure, but they will breed in almost any mass of fermenting organic material. Manure piles and stables

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should be screened, and the manure removed at least once in seven days. Garbage pails should be kept tightly covered. Fly-paper and fly-traps should be used. Houses should be screened, and in particular in the pantry the food itself should be screened.

Ticks, bedbugs, fleas and lice should also be carefully exterminated. They are often responsible for infectious diseases. The hookworm disease is to be avoided by not treading barefoot on ground polluted by victims of the disease, by preventing soil pollution through the proper disposal of human excrement, and by screening all waterclosets.

Cleanliness is important for avoiding infections. The hands, face and finger nails should be kept clean; especially before meals. Any cut or crack in the skin or mucous membrane may admit germs when the spot is dirty or is touched by dirty hands. The need of bathing is particularly great for those who work in factories, mines and other places where dirt is likely to be carried to the mouth by the hands. Probably many diseases get a foothold in this way, without the victims realizing in the least that they were due to carelessness and lack of cleanliness.

Some of the most serious and widespread, although usually unmentioned, infections, are those from the venereal diseases, with a whole train of terrible consequences, such as blindness, joint-diseases with heart complications, peritonitis, paralysis and insanity. From even the narrowest interpretation of hygiene, a decent life is necessary for the maintenance of health. Dr. Rosenau says: "Every boy and girl, before reaching the age of puberty, should have a knowledge of sex, and every man and woman before the marriageable age should be informed on the subject of reproduction and the dangers of venereal diseases. Superficial information is not true education. On the other hand, it is a mistake to dwell unduly on the subject."

13. Keep the teeth, gums and tongue clean.

There are two forms of mouth danger—dental caries, or decay, and pyorrhoea, or Riggs' disease. The former is largely a chemical process, and affects the teeth proper. The latter affects the tissues surrounding the root of the teeth and is accompanied with infection by pus bacteria, and possibly also with animal parasites termed *endameba*. Scrupulous cleanliness of the mouth largely prevents both of these maladies.

A cavity in a tooth is a menace to the health, as it harbors various forms of bacteria which may infect the general system. The same is true of pyorrhoea, as far as the general health is concerned. The germs from the abscess may get into the system and cause many other kinds of illness, such as so-called rheumatism, certain forms of anemia, etc. All the ills that flesh is heir to are not caused by mouth infection, but enough of them are to more than justify a vigorous and world-wide campaign for the better care of the teeth, and for a thorough search for mouth infection in every case of obscure disease.

The cultivation of normal eating habits with respect to the vigorous use of the jaws by thorough mastication, and the eating of hard, resistant, crusty foods every day is the next desirable means of tooth and gum hygiene. The teeth should be cleaned night and morning, and after each meal, if possible, by rapid rotary brushing. Strong pressure is not advisable. A brush should be used with bristles that are stiff and of different lengths, so that the innermost crevices of the teeth may be reached. If the gums are sensitive, a moderately stiff brush can be used until the gums can bear the more vigorous treatment. The use of dental floss between the teeth, provided care is taken not to press it against the gums, is also helpful.

The tongue should also be carefully cleansed with the tooth brush. By taking care not to hit the roof of the mouth, gagging is avoided.

The advice of a dentist should be sought regarding the condition of the teeth, and the question of alkaline or acid washes determined. Periodic examinations and cleanings by the dentist are the only safe measures against decay and pyorrhoea. If the dentist has facilities for giving preventive treatment by specially cleaning the teeth, he should be visited every other month. If such a program is adopted, it will generally be found unnecessary to visit him for any other purpose.

Some dentists and physicians have until lately given too much attention to the saving of teeth, without fully realizing the dangers of infection from the mechanical devices employed. This is not to say that all bridge and crown work is improper, but that such work should only be of a character that will permit of surgical cleanliness in the mouth, and that such teeth should always be examined by the X-ray, when there is evidence of systematic disease, in order to be sure that the roots and sockets are not infected.

In early life the jaws should be carefully examined by both dentist and doctor in order to determine whether or not the proper development is taking place. If upper and lower teeth fail to fit well together, extra strain is placed upon certain teeth and the sockets are liable to injury and infection. The temporary teeth should not be allowed to be removed by decay. If cavities form, they should be filled and the teeth saved, unless they are causing infection.

14. Work, play, rest and sleep in moderation.

The whole personality should be utilized in a daily rhythm. When, as too often happens, the equilibrium and mutual proportions of the various wholesome elements in a well-rounded life have been lost, the balance should be restored if possible the next day. If a physician has had his sleep broken, he should aim to make it up at the earliest opportunity. If the afternoon exercise has had to be omitted, an extra amount should be taken as soon as possible.

It is distinctly unhealthful either to overdo or to underdo work, play, rest or sleep. Not all people are in need of exercise, nor are all in need of rest; but almost every one needs to change his proportion between the two. Normal work is one of the greatest blessings of life, but too many miss the joy of it, some, because their work has gone to the extreme of drudgery, and others, because it has shrunk into nothingness and futility.

A very moderate degree of fatigue is normal, but anything that approaches exhaustion should be avoided with the utmost care. Working hours should be arranged so as to enable the worker

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to recuperate overnight, partly from sleep and partly from the recreation enjoyed in leisure between work and sleep. Variety in work is especially needed in modern times, when specialization tends to lead men to extremes. Changes in work which prevent a sense of monotony will greatly increase the power to work. A clerk will do more work, and do it more effectively, if he is occasionally allowed something else to do than to foot up columns of figures. If the monotonous strain of performing numerical additions is interrupted a few times daily, the adding faculty of the brain is given much-needed rest. Many men in the higher ranks of life complain of the many interruptions which they suffer, but if they would welcome these interruptions, instead of allowing themselves to be irritated by them, each interruption would serve the purpose of a vacation. It is in this way that some of the greatest workers, like Gladstone, have been enabled to accomplish so much.

The strain of modern life is sometimes special rather than general, and one of the most commonly-strained organs is the eye. One should be careful not to read in a waning light, or on the other hand, in the glare of the sun. If one works facing a window, it is advisable to wear an eyeshade.

To offset the evils of a sedentary life, it is advisable to spend one hour daily, if possible, in some kind of vigorous physical exercise. If this is not possible, at least fifteen minutes should be taken for it. The most beneficial exercise, as a rule, is that which stimulates the heart and lungs, such as running, rapid walking, hill-climbing and swimming. These should, of course, be graduated in intensity with varying ages and varying degrees of vitality. Gentle muscular activity after meals promotes general digestion and should be practiced for a quarter of an hour after each meal, but violent exercises immediately after meals should be avoided, as a large amount of blood is then engaged by the digestive system.

There is accumulating considerable evidence that college athletics often seriously injure those who engage in them, although they were originated and encouraged for precisely the opposite effect. The value of exercise consists not in developing large muscles nor in accomplishing athletic feats, but in attaining physical poise, symmetry of form and the harmonious adjustment of various parts of the body, as well as in furthering the proper activity of cell-tissues and organs and the elimination of waste products.

Not only the functions of the body, but those of the mind require exercise—exercise in thinking, feeling and willing. A person who does not read or think loses some of the ability to read and think. The physical worker often allows his mind to become dull and sodden. The accountant who adds up figures all day has no chance to exercise his judgment and other mental faculties. The person who does not exercise his artistic, poetic or affectional side will suffer its atrophy. The exercise of the will is of first importance. The will is exercised every time a decision is made.

Since the work of most people is likely to produce some unhygienic element which cannot be avoided, a compensation should be sought in an avocation or hobby, to be practiced out of regular working hours. Often the avocation can serve a productive purpose. Gladstone and Horace Greeley sawed wood or chopped down trees for recreation. A well-known engineer divided his recreation between writing stories and painting pictures.

The power to relax, when fatigue requires it, is one of the most important safeguards one can possess. A very hard-working college president, when asked about the secret of his working power and length of life, replied, "My secret is that I never ran when I could walk, never walked when I could stand, never stood when I could sit, and never sat when I could lie down." For idle and lazy people the rule should be reversed—never to lie down when one could sit, never to sit when one could stand, and never walk when one could run! A complete life must have all in due proportion.

Sleep is Nature's great rejuvenator, and the health-seeker should avail himself of it to the full. Our sleep should not only be sufficient in duration but also in intensity, and should be regular. The number of hours of sleep varies with circumstances. The average is seven to nine. Growing children require more sleep than their elders.

One's best sleep is on an empty stomach. It is true that food puts one to sleep at first, by diverting blood from the head; but it disturbs sleep later. Water, unless it induces bladder action during the night, or even fruit, may be taken without injury before retiring. If one goes to bed with an empty stomach, he can often get along well with six or seven hours of sleep, but if he goes to bed soon after a hearty meal he usually needs from eight to ten hours of sleep.

The character of sleep depends largely on the mental attitude on going to bed. One should get into the habit of absolutely dropping work and cares at bedtime. If then one suggests to himself the pleasantest thought which memory or imagination can conjure up, his sleep is likely to be far more peaceful and restful than if he takes his worries to bed, to keep him awake until sleep comes in spite of them, and then continues to plague him in his dreams. If one is worried, it is a good plan to read something diverting, but not exciting, just before retiring.

15. Keep serene.

A healthy mental attitude implies many elements, but they are roughly summed up in the word "serenity." The attitude of "healthy-mindedness" should be striven for not only in order to procure health, but as an end in itself, for which in fact even health itself is properly sought. In short, the health of the body and the health of the mind act and react upon each other.

We may generally keep serene through following the hygienic measures already described. Discontent is undoubtedly very often the consequence of wrong conditions in the body, and though melancholy, worry, peevishness and fear generally appear as arising from outward conditions, there are usually real physical sources, existing within the body itself. These are at times most difficult of recognition. A person who is physically ill is liable to be ill-satisfied with everything, without suspecting the fundamental cause of the

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discontent. When the apparent "cause" is removed, the discontent remains none the less, and fastens itself on the next thing that comes along. Although some little event such as the mistake of a tradesman or a cross word of a friend may seemingly "cause" a disagreeable reaction in a man if he is ill (whether he knows it or not), the same "cause" does not necessarily produce that same reaction at all times. When he is in a healthy mood, the "cause" may be entirely inadequate to bring about the same result. The near approach of the menstrual period in women is often accompanied by mental depression and physical fatigue which it is almost impossible for the sufferer to recognize at the time as caused by anything but "real" or outside misfortunes. Other physical conditions act in the same way. The hidden cause may be constipation, eye strain, the effects of alcohol or other drugs, a sedentary life, a bad posture or weak abdominal muscles; and the proper remedy may be an enema, a pair of glasses, a vigorous swim, deep breathing exercises or an abdominal supporter, an erect carriage or a general change of daily habits. Whatever the trouble, the remedy lies always at hand.

Summary. Health for the body awakens mental capacities where they exist. Failure in mental work can often be traced to failure in physical health; and the restoration of bodily health is often essential to success in the tasks of the mind. This is especially true of the artistic professions, where the kind of product is dependent so largely upon the state of the emotions, upon exhilaration and enthusiasm.

It is certain that mental perturbation affects the body in many ways. Embarrassment fills our cheeks with blood. Fear drives the blood away. Excitement quickens the heart beat. Grief brings tears. A great shock to the mind may cause fainting, the rush of blood from the head into the abdomen. Worry will interfere with digestion. The X-ray has detected the arrest of the peristaltic movement of the stomach and intestines because of strong emotions.

It is doubtless on account of such influences of the mind on the body that some persons who have attempted to improve their health by what they call "thoroughly masticating" their food—but who have interpreted this phrase as having a purely mechanical meaning—have wondered why they were not benefited when they forcibly held their food in their mouths until they performed a certain number of chews, while in fact they were making a bore of eating and forgetting to taste and enjoy. The mind and the emotions refuse to be ignored in this way, and exact due penalty from the body when they are not satisfied. To attain the desired results from any hygienic measures, it is apparently necessary, in some degree at least, to satisfy the mind along with the body.

There is one danger to which some people are especially subject—the danger of becoming hypochondriacs from paying too much attention to physical hygiene. Such a person becomes fearful lest he is not doing exactly the right thing. He looks suspiciously at every article of food, and fears that it will disagree. He fears that he has strained his heart; he worries over the loss of an hour's sleep; he chafes because his employer has not given him a vacation at the right time or of the right length. It might, in some cases, be better to disregard some rules of hygiene than to worry about them.

On this theory the devotees of mind-cure cults have derided every hygienic measure but one—their "mind-cure." They sometimes succeed in the "real cure of imaginary ailments" and the "imaginary cure of real ailments." In the latter case, the mental contentment lasts only until the real ailment becomes too aggressive to be ignored. But it is a great mistake to stake everything on the simple resource of mental equanimity. In its proper place "mind-cure" is an essential part of individual hygiene.

Each must learn for himself how best to avoid anger, fear, worry, excitement, hate, envy, jealousy, grief and all depressing or abnormal mental states. To do so is an art which must be practiced, like skating or bicycle riding. It cannot be imparted merely by reading about it. Worry, if unceasing, will often drain away a large source of energy. When, as unfortunately is often the case, the difficulty of maintaining one's serenity seems insuperable, the battle can often be won by "living one day at a time." Almost any one in ordinary conditions of adversity has it within his or her power, for merely one day, or at any rate one hour, or one minute, to eliminate the fear, worry, anger, or other unwholesome emotions clamoring to take possession. At the expiration of the hour, or the minute the same power can be exercised for the next ensuing period, and so on until one is caught napping, after which he must pick himself up and patiently try again.

The secret of equanimity consists not so much in depressing the fear or worry as in dropping or ignoring it—that is, diverting and controlling the attention. It does no good to carry a mental burden. "Forget it!" The main art of mental hygiene consists in the

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control of the attention. "He that ruleth himself is greater than he that taketh a city."

Thoroughly carried out, individual hygiene, as practiced five hundred years ago by Cornaro, and as now being practiced by hundreds of thousands of modern men and women, implies high ideals of health, strength, endurance, symmetry, and beauty; it enormously increases their power to work, to be happy and to be useful; it develops not only the body, but the mind and the heart; it ennobles the man as a whole. E.L.F.

Related Subjects. The reader is referred to the following articles in these volumes:

Alcoholic Drinks
Health Habits
Hygiene of Education (subtitle, page 1944)
Medicine and Drugs
Mental Handicaps

LIFE INSURANCE. See INSURANCE.

LIFE, Length of, or **LONGEVITY,** *lon jev'i ti,* terms which are used to denote the average duration of life in man, different animals and plants. Since almost all forms of life differ from each other in the rapidity with which they develop, it is logical that few forms should have the same span of life. Plants, for instance, ordinarily grow up and die in a few months; yet spruce trees may live for 150 years, and a native tree of the Cape de Verde Islands, known as the *bavbab,* lives 5,000 years. The Big Trees of the Yosemite Valley in California are also centuries old (see page 1059).

In the case of animals it is usually those which take longest to reach maturity which have the longest lives. Below is given the estimated length of life in years of a representative number of animals. The extreme ages are not given, but the ages which the animals may be expected to reach under normal conditions appear as follows:

Animals

Whale	500	Pig	25
Tortoise	350	Cow	25
Crocodile	300	Ox	15-20
Elephant	100	Goat	15
Lion	40	Frog	12-16
Camel	40	Dog	15
Toad	36	Cat	13
Horse	27	Sheep	12
Leopard	25	Hare	10
Bear	25	Squirrel	6
Tiger	25	Mouse	6

Birds

Eagle	100	Goose	50
Swan	100	Sparrow	40
Crow	100	Skylark	30
Heron	60	Peacock	24
Parrot	60	Crane	24
Pelican	50	Canary	24
Linnet	23	Goldfinch	15
Pigeon	20	Hen	14
Nightingale	18	Blackbird	12
Lark	18	Robin	12
Pheasant	15	Thrush	10
Partridge	15	Wren	3

Fish

Carp	150	Eel	60
Pike	150	Lamprey	60
Salmon	100	Crayfish	20

According to statistics the average age at which man dies is about forty years, but because of advance in knowledge of medicine and sanitation this average will gradually rise (see MORTALITY, LAW OF). A considerable number of the human race live to be from seventy to eighty years of age, and there are occasional instances of people attaining the age of one hundred years.

LIFE-SAVING SERVICE. Those who "go down to the sea in ships" from the ports of nearly all countries in the world north of the equator, except China, know that everywhere dangerous shores are patrolled by men skilled in the most scientific means of saving life. In most countries this humane service is supported by private contributions. In four only does the government assume its organization, management and expense. The South American republics, the vast stretches of African coasts and the semi-civilized Asiatic countries afford no means of saving life other than unorganized effort.

In the United States. The life-saving service of the American Union is the most notable example of government-controlled systems in the world, and is unsurpassed in efficiency. It was established by the Federal government in 1871. As early as 1807 benevolent organizations established life-saving apparatus on the Massachusetts coast; and the New Jersey shores, approached by a greater number of vessels, were equipped by the government with apparatus for the use of volunteers. From such a small beginning the service has been extended to include the eastern and western coasts, the Gulf territory, the Great Lakes and Alaska. Most of the stations are maintained all the year, but some, particularly on the Great Lakes, are in operation only seven or eight months of each year.

Each life-saving station is equipped with a serviceable building, sufficiently large to provide living quarters for the men and space for boats. A surf-boat is usually made of cedar, about twenty-five feet long and six to eight feet wide. Air chambers make it practically

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unsinkable. When the sea is so rough that a boat cannot be launched a small bronze cannon is used to shoot a projectile to the vessel in distress. The range is from 400 to 700 yards. The projectile is a long bar, to one end of which is fastened a strong line. Over the rope thus stretched a breeches-buoy can be pulled from the vessel to the shore and passengers and crew may thus be rescued. The breeches-buoy is a circular life-preserver with a diameter of about three feet, to which stout canvas breeches are attached. It holds one person. See *Life Boat and Life Buoy,* below.

Until 1874 the life-saving organization was a division of the Revenue Cutter Service, and from that year until 1915 it was a bureau of the Treasury Department. The system was again reorganized by act of Congress passed on January 28, 1915, containing the following provision: "There is hereby established in lieu of the existing Revenue Cutter Service and the Life-Saving Service, to be composed of

LIFE-SAVING SERVICE
A lifeboat and light track by which it is easily and quickly put into the water. This is the most modern development in the mechanics of the service.

those two existing organizations, the *Coast Guard,* which shall constitute a part of the military forces of the United States and which shall operate under the Treasury Department in time of peace, and operate as a part of the navy, subject to the orders of the Secretary of the Navy, in time of war." The officers of the Coast Guard are on the same footing, with respect to rank and pay, as the officers of the army and navy. The Coast Guard stations are divided into thirteen districts, embracing the Atlantic, Gulf, Great Lakes and Pacific coasts, including Alaska. There are 279 Coast Guard stations and houses of refuge. One of these stations is located at the Falls of the Ohio, near Louisville, Ky. The following table shows the extent of service rendered for the fiscal year ending June 30, 1916:

Lives saved or persons rescued from peril	1,507
Persons on board vessels assisted	10,952
Persons in distress cared for	813
Vessels boarded and documents examined	24,817
Regattas and marine parades patrolled in accordance with law	37
Vessels to which assistance was rendered	1,504
Instances of miscellaneous assistance	556
Value of vessels assisted (including cargoes)	$ 10,927,730
Derelicts and obstructions to navigation removed or destroyed	26
Value of derelicts recovered and delivered to owners	$ 161,000
Total expenditure for maintenance of Coast Guard	$5,027,752.71

In Canada. In the Dominion the life-saving service is an important arm of the government. Canada has a coast line of great extent, but protection is required along only a small portion of it, as there is no navigation along the entire northern boundary, and the barren coast of Labrador, comprising a large part of the eastern boundary, has no maritime interests. The western coast of British Columbia, however, is becoming increasingly important, and the Great Lakes present practically the same life-saving problems to Canada as to the United States. The most important maritime sections of Canada center around Prince Edward Island, Nova Scotia, New Brunswick and for a distance up the Saint Lawrence River.

The Canadian service is a branch of the Dominion Department of Marine and Fisheries, under the direction of a General Superintendent of Life-Saving Stations. Halifax and Montreal are transatlantic shipping centers; the coasts adjoining are well patrolled. Victoria, Prince Rupert and Vancouver are west-coast centers of importance. Stations of the life-saving service are distributed as follows: New Brunswick, 3; Nova Scotia, 16; Prince Edward Island, 4; British Columbia, 4; Great Lakes, 11; at Victoria, B. C., the service is maintained by a private organization, the Victoria Life-Saving Association.

In England. The Royal National Lifeboat Institution was founded in 1824, and has several times been reorganized, each time with increasing efficiency. Its patrons include the king and other members of the royal family, and the highest dignitaries of the realm. The

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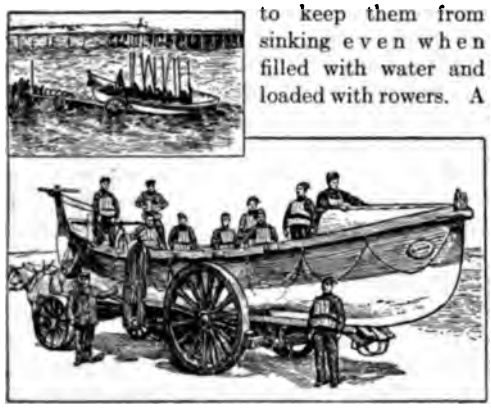
receipts from all sources are about three-quarters of a million dollars a year.

Other Countries. The life-saving organizations of Belgium and Denmark are supported by the government; that of France is a voluntary association receiving government support, and that of Germany is entirely supported by voluntary contributions. Holland and Norway maintain voluntary associations which receive government subsidies. The organizations of Italy, Australia and New Zealand are voluntary associations. E.D.F.

Life'boat, a stout, buoyant boat used in rescuing persons from the sea. Lifeboats of the latest design are so constructed as to discharge water that breaks into them; they are broad of beam and are equipped with air chambers to keep them from sinking even when filled with water and loaded with rowers. A transporting carriage, on which the boat rests, facilitates launching in a heavy sea. The first lifeboat was invented in 1785. For over fifty years prior to 1851, a boat invented by Henry Greathead was almost the only one in use.



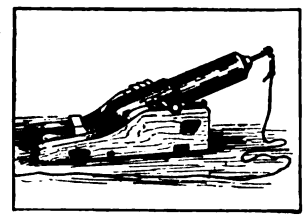
LIFEBOAT AND CREW

In case of heavy seas the boat may be drawn by horses to a place along the shore from which a call for help has come. The smaller illustration shows method of launching.

In the United States Life-Saving Service there is used a power lifeboat thirty-six feet long and over eight and a half feet wide at the broadest portion, which develops a speed of about nine miles an hour. This boat is equipped with sails and oars, besides a gasoline engine, the oars being provided for cases of emergency. The vessel has all the characteristic features of the modern oar-propelled boat, for it is self-baling and self-righting, and the engine, which is enclosed in a water-tight compartment, stops automatically in case the boat capsizes.

Life Buoy, a device for keeping persons afloat. The commonest type of buoy is a canvas belt filled with cork, which the wearer fastens about his body under the arms. It should be buoyant enough to support at least two persons for a considerable time. Another style of buoy consists of a sort of jacket, constructed of plates of cork held together by a stout casing. Each of these buoys is commonly known as a *life preserver,* and no passenger vessel or freight boat may sail without such equipment. Since such disasters as the *General Slocum* fire in New York and the *Titanic* loss laws relating to number and quality of life buoys have become more strict. There must be on all vessels as many life preservers as there are people aboard.

Life-Saving Gun and Rocket. Each life-saving station is now equipped with a small mortar capable of hurling an arrowlike projectile or other missile from the shore to a vessel in distress. The projectile carries a light rope, with which the ship's crew can haul a heavy hawser aboard. When this has been accomplished, passengers and crew may be conveyed to safety by means of the breeches-buoy, traveling over the line. A rocket is often substituted for a gun. At its head it carries a coil of rope, which runs out as the rocket approaches its object. Some of the guns used have a range of 700 yards, and the more powerful rockets can reach objects 1,000 yards distant.



GUN AND ROCKET

LIG'AMENT, in anatomy, a band of tough, white, flexible tissue, which serves to hold the ends of bones together and keep them in their relative positions. They are strong and pliable, but cannot be stretched unless the muscles and cords about a joint are severed. When the bones of a joint are pulled apart the ligaments are torn, and until they are healed the limb can be moved very little. A sprain is an injury in which the ligaments are torn or twisted, but where there is no dislocation of the bones. Torn ligaments require a long time to heal, and a period of complete rest must always follow a severe sprain. Those persons who have shallow sockets in the ball-and-socket joints are provided with long ligaments which enable them to twist themselves into some remarkable positions. Such persons make good acrobats.

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LIGHT. In the first chapter of *Genesis* there is told in the simple language of the Scriptures the story of the creation of light:

And God said, Let there be light: and there was light.

And God saw the light, that it was good: and God divided the light from the darkness.

And God called the light Day, and the darkness He called Night. And the evening and the morning were the first day.

When this was written, and for many centuries afterward, men knew little about light except that it was "good," and that its principal source was the sun, which Shakespeare in *Twelfth Night* calls—

That orbed continent, the fire
That severs day from night.

Even such wise men as Plato and Euclid, who lived about three centuries before Christ, thought that light traveled from the eye of the observer to an object, rather than in the reverse direction. The law of reflection (see subhead, *Reflection of Light,* below), however, was known both to the ancient Greeks and to the Arabs.

What Is Light? Through the Middle Ages and far into the modern period men were seeking the scientific explanation of the nature of light. Sir Isaac Newton (1642-1727), the discoverer of the law of gravitation, advanced the theory that light consists of minute particles of matter emitted in straight lines from a luminous body. Scientists who followed him discovered that many of the known phenomena connected with light disproved this explanation, and in the opening years of the nineteenth century the "wave-motion" theory, now generally accepted, was established by an Englishman named Thomas Young. To understand this theory we must know something about another belief that scientists accept almost universally—that all space is filled with a substance called *ether.*

The ether theory came about in this way: It was known that energy in the form of light and heat is transmitted from the sun and other glowing bodies, and that it can pass through space containing no air (a vacuum) as readily as through air. Clearly there must be some medium by which it is transferred from one place to another, and scientists have assumed that all space not occupied by matter is filled with such a medium. It is believed that this substance, to which the name *ether* is applied, is very elastic, that it cannot be compressed, and that masses of ordinary matter can pass readily through it. When a body is heated to a certain degree its vibrating molecules communicate their motion to the ether, and the resulting disturbances are sent through it in the form of waves which travel in every direction. The energy thus transferred is called *radiant energy.* We may now state the scientist's definition of light: *It is that portion of radiant energy that is capable of producing the effect of vision.* That is, light waves, consisting of vibrations in the ether sent out by a luminous (light-giving) body, strike the retina of the eye, cause the optic nerve to vibrate and produce the sensation of sight. In light waves, as in water waves, the vibration is perpendicular to the direction in which the waves travel.

Luminous bodies like the sun and stars are *natural* sources of light; the carbon of an electric lamp, which the electric current makes extremely hot, is an example of an *artificial* luminous body. Objects not in themselves luminous, such as the pieces of furniture in a room, become visible because of the light that they send to the eye of the observer, but this light is received from some luminous body. Light is itself invisible, though it has the power of dispelling darkness. This is shown in the well-known phenomenon of a sunbeam entering a darkened room. We see its path because the dust particles floating in the air reflect the sun's light. Were the air in the room absolutely free from dust the path of the sunbeam could not be seen. Also, when one sails far up in a balloon, where the air is practically clear, it grows dark and the stars can be seen.

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Length of Light Waves. Heat waves as well as light waves are transmitted from a glowing body, and the only difference between these is their length, the average heat wave being longer than the average light wave. The longest light waves are those that produce red light and the shortest those that produce violet light. The red waves and violet waves are therefore the two extremes of the range of vision of the normal human eye. Waves that are longer than those producing red light effect the skin and cause the sensation of heat; those shorter than violet rays bring about certain chemical changes. They affect the sensitive plate of the camera and make possible the photographing of objects not visible to the eye; they fade artificial coloring matters, assist in plant growth, destroy disease germs and cause sunburn and tan.

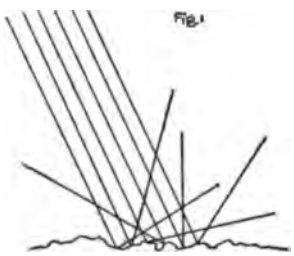
The vibrating molecules that start ether waves have a frequency of vibration beyond the power of the mind to grasp. The shorter waves have a greater number of vibrations per second than the longer, though all travel at the same rate of speed. Blue waves, for instance, which are much shorter than red waves, have a vibration frequency of 600 trillions a second.

Speed of Light. If we could travel to the sun, which is about 93,000,000 miles away, in an airship having the same velocity as light, we would make the trip in eight minutes and nineteen seconds. Light travels through space at an amazing speed, about 186,000 miles a second. One of the fastest of America's trains runs from Chicago to New York in twenty hours; light can cover the distance, 960 miles, in one two-hundredth of a second. It can readily be seen, therefore, that for all distances on the earth this rate is instantaneous. When we consider that the most distant stars that we can see in the firmament at night are so far away it takes their light about 5,000 years to reach us, we can form some idea of the infinite vastness of the universe. Light travels a little more slowly in air than in a vacuum, and still more slowly through such denser substances as glass and water.

A Straight-Line Advance. Did you ever stop to think why you cannot see around a corner, or why, when looking at an object through a tube, the view of it is cut off if the tube is bent? The reason is that light in passing through a medium of uniform density advances in straight lines. The surveyor knows that he can measure angles exactly because the light which comes from a distant object to his instrument follows a straight path. Upon this fact also depends the forming of a shadow when a body obstructs the passage of light. If a screen through which light cannot pass is placed between a lamp and a wall, for instance, that part of the wall opposite the screen will be in the shadow. The light waves, traveling in a straight line, strike the obstructing body; some of the waves are reflected back to the eye and the rest are absorbed, but none can pass out of their course and around the screen. Hence the unilluminated space behind it.

Transmission through Substances. An object like that described in the preceding paragraph, which cuts off light waves from a luminous body by absorbing them, is called *opaque;* light cannot pass through it. Some substances, such as glass, transmit it so easily that we can see clearly objects through them. We call such bodies transparent. Other substances, such as oiled paper, transmit light imperfectly, and objects are seen through them dimly. They are known as *translucent*. There is no sharp dividing line in the use of these terms, for the same substance under different conditions may be transparent and opaque, opaque and translucent, etc. Goldleaf, for example, though ordinarily opaque, can be made so thin that one can see through it; the water in a clean, shallow pond is transparent, but that in a deep lake is often opaque. Familiar examples of this fact can be multiplied.

Intensity of Illumination. A person makes a practical application of one of the laws of light every time he moves a chair nearer to the window or to a lamp so a better light may fall on the book he is reading. This law may be stated as follows: *The intensity of light decreases as the square of the distance increases.* Stated another way, an electric globe two feet from an object will throw four times as much light upon the object as when it is four feet away, and sixteen times as much as when it is eight feet away.



Reflection of Light. We have already learned that bodies become visible by the light which they send back, or *reflect,* to the eye. Reflection is defined as the *turning back of light waves, by the substance upon which they strike, into the medium through which*

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they come. In this connection it is customary to use the term *ray* to designate the path along which the waves travel. We can see bodies with a rough surface readily because the light rays are reflected irregularly, or diffused (see Fig. 1). That is, the reflected rays are scattered in every direction, and the body can be seen from any point.

When the surface of an object is very smooth, like that of a mirror, little if any light is diffused. Instead, most of the rays are reflected regularly and uniformly in a definite direction, and the light seems to come to the eye from distant objects instead of from the reflecting surface. That is why one sees his own image in a mirror, while the latter is itself invisible. In every case the image appears to be as far behind the mirror as the object is in front of it. In Fig. 2, let *A B* be an arrow held in front of the mirror *m n*. Rays of light from the point *A* strike upon the mirror at *D*, are reflected and enter the eye as if they came from *A'*. Rays from *B* seem to come from *B'*. The image, because it is seen in the direction of the reflected rays, appears at *A'B'*, which is as far behind *m n* as the arrow is in front of it. Such an image is known as *virtual*, because it has no actual existence apart from the eye of the observer.

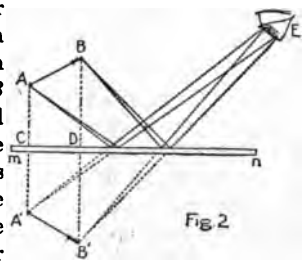

Fig. 2

The angle at which a ray strikes a reflecting surface is called the *angle of incidence*, and that at which it is sent back is called the *angle of reflection*. Comparing these angles, scientists have discovered the law of reflection, as follows: *The angle of incidence is equal to the angle of reflection* (see Fig. 3). It is interesting to note that the reflected ray has the same relative position as the striking ray, just as a ball thrown against a wall at an acute angle bounds away from the wall at the same angle.

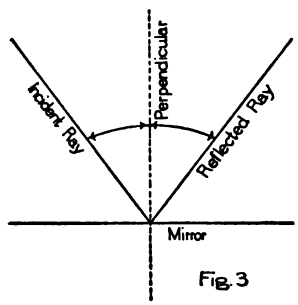

Fig. 3

Refraction of Light. We know that light travels in a straight line so long as it is passing through any one medium. Let us see what happens when a ray strikes a medium of a different density than the one in which it started. The straw through which you drink your lemonade looks bent at the surface of the liquid, and so does the spoon in a cup of clear tea. This is because light is bent or *refracted* from its straight course when passing from one medium to another of different density. There are two important laws to remember in connection with refraction:

(1) When light passes from a rare to a dense medium, it is bent in the direction of a line perpendicular to the surface of the refracting body.
(2) When it passes from a dense to a rare medium it is bent away from such a line.

These laws are illustrated in Fig. 4, which shows the path of rays through a windowpane. When a ray enters the glass it is refracted *toward* the perpendicular, and on leaving, is bent *from* the perpendicular; if the glass is clear the refraction is equal in both directions, and the objects seen through it appear natural. An uneven glass, by causing unequal refraction, would make the objects appear distorted.

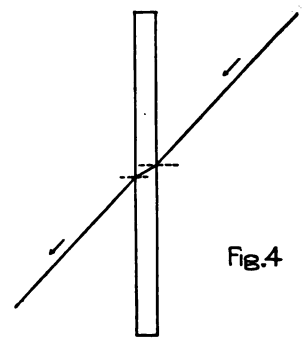
Fig. 4

In nature we see many examples of the principles of refraction. A mirage in the desert is often caused by the bending of the light rays as they pass from denser to rarer layers of air. The setting sun is viewed after the glowing orb has passed below the horizon, for the rays from it which reach the eye are bent downward, as they pass through the atmosphere of the earth, while the eye follows them back in a straight line. For the same reason we see the sun in the early dawn before it is really above the horizon. Rainbows are caused by refraction and reflection. Another illustration of refraction is the wavy appearance of hot air rising above a stove; the rays of light are bent as they pass through layers of air of varying densities. Again, if you look at a clear stretch of water from the side the bottom will seem to be raised, giving the effect of shallowness. This is due to the bending of the light rays as they pass from beneath the water into the air.

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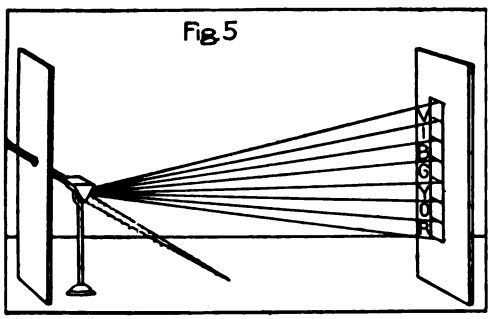
The Spectrum. One of the most beautiful of all natural phenomena is the bow of fairy-like colors that spreads across the sky when the sun shines on a mist or a shower of rain. Sir Walter Scott, in *Marmion,* asks—

> What skilful limner e'er would choose
> To paint the rainbow's varying hues,
> Unless to mortal it were given
> To dip his brush in dyes of heaven?

It was not until late in the seventeenth century that even scientists understood the cause of the rainbow, at which mankind had wondered since the day when God "set His bow in the heavens." To Sir Isaac Newton is due the honor of the explanation. He showed that all the colors of the rainbow are the component parts of white light, and that the bow is caused by the refraction and reflection of the sun's rays when they strike the drops of water at certain angles.

Fig 5 shows how Newton produced a band of colors similar to those of the rainbow. He



admitted a beam of sunlight through a small hole in the shutter of a darkened room, and in the path of the beam placed a glass prism and a white screen. The light in passing through such a prism is both refracted and spread out, appearing on the screen as a band of colors arranged in the following order: violet, indigo, blue, green, yellow, orange, red. Such a band of colors is called a *spectrum.* The order of the colors in the spectrum may be remembered by combining their initial letters into the "word" *vibgyor.* C.R.M.

Related Subjects. The following articles in these volumes will be of interest in connection with a study of light:

Aberration	Ether
Camera	Fluorescence
Color	Gas
Diffraction	Lamp
Electric Light	Lens
Electromagnetic Theory of Light	Limelight
	Microscope
Mirage	Reflection
Mirror	Spectroscope
Polarization of Light	Spectrum Analysis
Rainbow	Telescope

LIGHTHOUSE. The safeguarding of the mariner from rocks and shoals and other perils of the sea, by means of beacon lights, is an old, old story. We may trace the development of the lighthouse from the period when the ancient Libyans erected towers on the northern coast of Egypt, and hung from projecting poles braziers filled with burning fuel, whose light was a signal of warning to the sailor. Classic writers tell of a lighthouse erected about 300 B.C. on the island of Pharos, known as the Pharos of Alexandria, and famed as one of the seven wonders of the ancient world. The Romans built light towers at several ports of the empire, and after the conquest of Britain they safeguarded vessels on the stormy English Channel by erecting lighthouses at Dover and at Boulogne, on the French coast. The tower at Boulogne was a guide to mariners for over fourteen centuries, and was one of many similar structures that protected the navigators of the Middle Ages.

Modern Lighthouses. Lighthouses of to-day not only serve to warn vessels of approach to reefs and shoals, but they are also erected at appropriate points to guide mariners into the entrance of harbors. Some are built on isolated rocks out at sea, some on bluffs or promontories along coasts, and others have their foundations in shallow parts of the sea at long distances from shore. Their construction is therefore determined by their location and the objects for which they are built. Lighthouses exposed to the fury of fierce ocean gales, the constant beating of wind and wave, or the pressure of floating ice, must be solidly built on sure foundations. The tower of stone masonry, nearly cylindrical in form but gradually narrowing from base to top, is typical of many older lighthouses, while huge, cylindrical towers of steel, bolted into solid rock or constructed on foundations of stone or concrete are representative of later designs. Stone, brickwork, concrete, structural cast iron, steel and timber have all been employed in lighthouse building.

On land sites, where there is ample space about the tower, the keeper's quarters, workshop, storage rooms, etc., are in adjoining buildings, but the various compartments are housed in one structure when the light station is built out at sea. Occupants pass from room to room by means of a winding staircase. The

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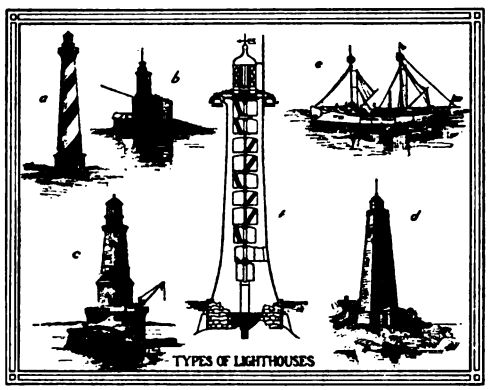
keepers of lights far from the mainland sometimes lead very lonely lives, and their faithfulness and heroism have often been praised in song and story. Nothing more inspiring, however, has ever been written than the true story of Grace Darling, whose father kept the lighthouse on Longstone, one of the Farne Islands, and who risked her life to save the survivors of a wreck on a neighboring reef.

Great light towers, standing like sentinels at the danger points of the ocean, make an irresistible appeal to the imagination. Such a



(*a*) Cape Hatteras light station, North Carolina.
(*b*) Saint George's Reef light station, California.
(*c*) "Rock of Ages" light, Lake Superior.
(*d*) Sandy Hook light, New York.
(*e*) Brenton Reef lightship, off Newport, R. I.
(*f*) Eddystone lighthouse, cross section view. The living rooms are near the top; the bedrooms are on the floor below the light.

lighthouse is the one which stands on Inchcape or Bell Rock, off the east coast of Scotland, on a dangerous reef in the North Sea, twelve miles from land. The lighthouse was completed in 1810, and there is a tradition that long before it was built sailors were warned of their approach to the danger point by the tolling of a bell, which had been placed on a buoy by the good abbot of Aberbrothok. In Southey's famous poem, *The Inchcape Rock,* this legend is told in thrilling verse.

The rock on which the Bell lighthouse stands projects only a few feet above the water at low tide, and when the builders began the work of clearing the seaweed from the surface they were forced to lie flat every few minutes and cling to the weeds in order to keep from being washed into the sea by the waves. After the top was cleared, holes were drilled into the rock, iron rods were driven into them, and around the rods was built a strong iron platform. Upon this the lighthouse, 115 feet high, was built.

The construction of the new lighthouse at Beachy Head, on the southern coast of England, was attended with equal difficulty. This tower was built at the foot of a high cliff and out in the open sea. A great hole was made in the sea bottom, and at low tide the workers built around the hole a thick, high wall, forming an enclosure which was at all times protected from the sea. Within it were laid the foundations of the lighthouse. A strong iron platform, resembling a short pier, was built in the sea as a workshop. Strong wire ropes carried men, tools and materials from the top of the cliff to the platform and back again, and the blocks of granite which formed the stonework of the tower were all shaped and fitted on land before they were permanently joined together. It will thus be seen that lighthouse building presents many engineering problems, and could the story of every light tower be told one might read a series of narratives of absorbing interest.

The Light. Inasmuch as the tower is erected solely for the purpose of giving out light, the lantern with its enclosed lamp is the most important part of the structure. In lighthouses of modern construction the lantern consists of a light, metallic frame which holds in position a series of lenses (see LENS). These form its sides. The largest lanterns are usually about twelve feet in diameter and ten feet high, and their light can be seen over the water for a distance of twenty miles or more. The number of sides or faces depends upon the style of light desired, this number varying from two to eight. The center of each face contains a large plano-convex lens which is surrounded by a number of rings of prisms, so constructed as to reflect in parallel lines all rays of light which strike them. In the large lights the number of these prisms runs into the thousands.

The lantern is mounted on a carriage which moves on rollers or is floated in a tank of mercury. When in use it is made to revolve by clockwork, which is kept in motion by a suspended weight. A beam of light can be seen only when a face of the lantern is directly opposite the observer; therefore when the lantern revolves it gives out as many flashes as it has sides. By covering any side with colored glass a light of corresponding color can be seen. Lighthouses show various kinds of signals, including besides the flashing light the *intermittent,* or *occulting* light, which is suddenly turned on and off at varying intervals; the

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group flashing light, where two or more flashes are followed by an eclipse of several seconds; fixed lights, and others. The United States government has arranged a code whereby the number of flashes, exact time of revolution and relative number of red and white flashes of a given signal are recorded and numbered, and the lighthouse corresponding to any number may be found by the mariner in the *Light Lists* which he carries with him. These *Lists* are published by the Lighthouse Board.

In the earliest lighthouses wood or coal burned in braziers provided illumination, but modern sources of light consist of mineral oils (chiefly petroleum), coal and oil gas, acetylene and electricity. Kerosene is the illuminant used in the majority of United States coast stations, but one of the most powerful lights maintained by the Lighthouse Board is that at Navesink, at the entrance to New York Bay, which consists of an electric arc with an estimated candle power of 25,000,000; this apparatus flashes a white signal every five seconds.

Some Notable Lighthouses. The Eddystone Lighthouse, one of the most famous in the world, stands upon a dangerous reef in the English Channel. It is 132 feet high from high-water level to the focal plane of the lantern and is built of stones cut so as to interlock. A light tower of unusual height was constructed at One Fathom Bank, on the Strait of Malacca, in 1908, the light being raised on a superstructure 925 feet above the water. The foundation was laid on piles, which were driven through the sand to firmer material below. Among the notable lighthouses on the North American coast are those at Minot's Ledge, in Massachusetts Bay; Spectacle Reef, in Northern Lake Huron; Tillamook Rock, in the Pacific Ocean, twenty miles south of the Columbia River; and the great tower at Barnegat, New Jersey, which is equipped with a lens having a bull's-eye in the center eighteen inches in diameter. Were it not for the curvature of the earth's surface, its powerful light, equal to 30,000,000 candle power, could be seen by sailors 100 miles from shore. The new Kilauea Point Lighthouse, on one of the Hawaiian Islands, is also notable for its lens, which is twelve feet high and weighs four tons.

ONE OF THE WORLD'S GREATEST LENSES

It is twelve feet high, weighs four tons, and was made in France at a cost of $12,000. This lens is in a lighthouse in Hawaii, completed in 1917. It revolves on a mercury float, and its light, 940,000 candle power, is visible twenty-five miles.

Lightships. These are in effect floating lighthouses. Vessels equipped with signal lights are stationed at dangerous points off coasts, at approaches to harbors and at other places where lighthouses cannot be built. Ships of the most modern design carry a steel lantern mast large enough to contain a ladder by which access is obtained to the lantern. The latter is constructed on the same principle as the illuminating apparatus of a lighthouse. Powerful fog signals are also a part of the equipment. More than forty lightships guard the coasts of the United States; the light vessel anchored on the dangerous South shoal, twenty-six miles off Nantucket Island, is farther from shore than any other such ship in the world. Buoys and beacons are also placed in narrow sounds, rivers and estuaries, where the danger to navigation is not great enough to warrant the construction of lighthouses or the anchoring of lightships.

Lighthouse Service. Practically every nation with coast waters maintains a lighthouse service. The United States Lighthouse Board constitutes a bureau of the Department of Commerce. The Canadian service is under the direction of the Department of Marine, and in England the lights are in the care of Trinity House Corporation. The Scottish lights are managed by the Commissioners of Northern Lights, and those of Ireland are cared for by the Corporation for Preserving and Improving the Port of Dublin. The lighthouse board of France, known as the Commission of Phares, is under the direction of the Minister of Public Works. In Denmark, Austria, Holland, Russia, Sweden and Norway the lighting of the coasts is under the care of the Minister of Marine, and in Belgium the lighthouse service is controlled by the Department of Public Works. B.M.W.

LIGHT'NING, a flash of light in the sky caused by electrical discharge between clouds, or between clouds and the earth. Lightning is one of the most mysterious and least understood of natural phenomena. Centuries ago the ancient Greeks and Romans felt the mys-

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tery and the danger of lightning and thunder; they believed that these were weapons in the hands of Zeus, or Jupiter. So powerful and so deadly were these weapons that they could belong only to Jupiter, greatest of the gods. Modern science has removed much of the mystery surrounding lightning, and has proved that lightning is really atmospheric electricity.

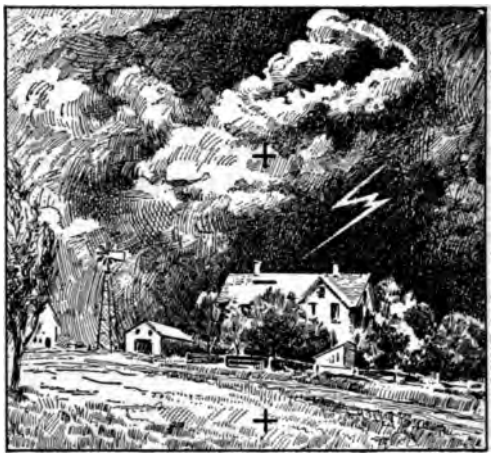
It was Benjamin Franklin who first showed the identity of electricity and lightning. He made a silk kite, near the top of which he fastened a piece of wire. He next attached a long string to the kite, tied an iron key to the free end of the string and fastened a silk ribbon to the key. Silk is not a conductor of electricity. One day in a heavy thunderstorm he sent up the kite. The first thundercloud passed without any apparent effect, but as a second one came near the kite he saw that the loose ends of the string stiffened. He put his hand near the key and instantly felt a shock as a tiny spark bridged the space from the key to his finger. Rain then fell heavily and the wet kite string carried so heavy a current of electricity that Franklin charged a Leyden jar (which see).

What Causes Lightning? Franklin first proved that lightning is electricity, and then showed by experiments that the electricity in the clouds is both positive and negative, exactly as some bodies on earth, when electrified, produce positive or negative electricity. The earth's surface as a whole is charged with negative electricity, whereas most of the clouds are charged with positive. The difference between these two kinds of electricity is chiefly a difference in condition rather than in nature, as explained in the article ELECTRICITY.

The important point to remember is that positive and negative charges of electricity mutually attract each other. Nobody knows why this is true; scientists have merely learned it by experiment. The air, however, is a nonconductor, that is, it does not hold electricity, and as the winds blow the clouds here and there the different charges of electricity seek a weak spot in the wall of air separating them. When this weak spot is found the electricity jumps across the space with a flash which is called *lightning*. A flash of lightning is exactly like a spark from a Leyden jar or from any other charged body.

Perhaps the lightning flash will be more easily understood by comparison with water. Let the reader imagine that a dam is placed in such a way that it prevents two rivers from making a junction; then imagine the shower of spray which will rise when the dam suddenly breaks. When two clouds, or the earth and a cloud, get so close together that there is an electrical discharge, there is a shower of sparks. Very few people realize that a flash of lightning is really a succession or shower of flashes so close together that they seem like one to the naked eye.

All electrical discharges are alternating, that is, every spark is followed by a pause. These intervals between sparks vary from a few thousandths to a few millionths of a second



POSITIVE AND NEGATIVE ELECTRICITY
Lightning is an electric discharge between two clouds, one electrified positively and the other negatively, or between a cloud and the earth. Positive electrification is indicated above by the sign +; negative, by the sign −.

in length. Lightning is a discharge of electricity from countless millions of electrified particles in the clouds or on the earth, and a flash is made up of these countless sparks which all occur at the same time. This mixture of sparks and pauses causes the flickering or vibrating appearance which is frequently noticed in lightning.

Why Are Clouds Charged with Electricity? While it is clear that lightning is caused by electricity in the clouds, yet the question arises, "Why are clouds charged with electricity?" Nobody has yet explained to everybody's satisfaction what electricity itself is, and nobody has yet proved why it is found in the clouds. Scientists have said that it is due to friction in the air caused by floating particles of dust, or to friction caused by snowflakes and particles of water in the upper layers of clouds. It has also been suggested that it is in some way the result of the evapora-

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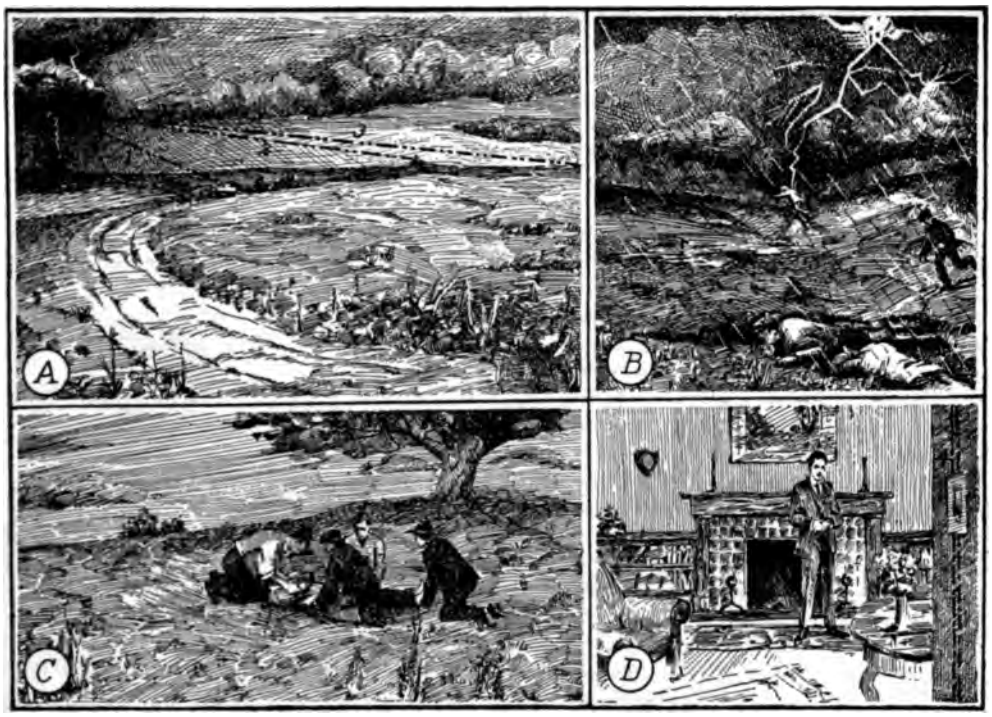

HOW TO AVOID BEING STRUCK BY LIGHTNING

(*A*) Distance from storm. It takes five seconds for the noise of thunder to travel one mile; (1) is two and a half seconds, or half a mile, and is safe for the time being; (2) is the safe distance of a mile, and (3) is two miles.

(*B*) If caught on open ground, lie flat. It is dangerous to stand or run.

(*C*) Treat a person who has been struck by lightning in the same way as one who has been nearly drowned (see DROWNING).

(*D*) In a thunderstorm avoid placing yourself between two conductors such as a gas main (4) and the fireplace.

tion of water from the surface of oceans, lakes and streams, but this theory has not won much support. A more probable explanation is that electricity in the air is due to the constant bombardment of the outer layers of air by hosts of electrified particles, called *electrons,* issuing with enormous velocity from the sun.

Kinds of Lightning. There are three recognized forms of lightning, the first of which is called *forked, zigzag* or *chain lightning.* This is a line of brilliant light; it usually appears zigzag to the eye, but in fact is winding like a river. The single streak often breaks into several branches or forks. The second kind is called *sheet lightning.* This has no particular form, but is usually a bright flash which spreads uniformly over the horizon and lights up the skies. Sheet lightning is really the illumination in the sky due to zigzag or chain lightning which is itself beyond the horizon or is for some other reason invisible to the eye. *Heat lightning,* frequently seen on summer evenings, is practically the same as sheet lightning. The third form of lightning is called *ball lightning.* Balls of fire, a foot or two in diameter, descend slowly from the clouds, until they strike the earth; sometimes they even roll along over the ground. The ball explodes when it hits the ground or some obstacle, but it does not seem to be very dangerous. Ball lightning is the least understood of all forms, and it is only in recent years that scientists have begun to investigate it; previously it was classed with the sea serpent and other semimythical wonders.

Why Thunder Follows Lightning. The electric discharge, as it breaks its way through the atmosphere, instantaneously heats the air in its path. This sudden heating causes a violent expansion of the air along the path of the lightning flash, and a violent compression of the cool air farther away. This process starts a great air wave which is the thunder. When a lightning flash occurs near by, the sharp, crackling reports come from its branches, and the heavy crash comes from the trunk of the flash. The rolling thunder comes from

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the more distant part of the trunk, and is continued by echoes among the clouds. Light travels 186,000 miles per second, a rate practically instantaneous. Sound, on the other hand, is slow, traveling at the rate of only about 1,100 feet per second. By counting the time interval between the flash and the thunder, an observer can tell how far distant is the flash. This interval is seldom more than seventy or eighty seconds. Because of the refraction of sound as it makes its way through the atmosphere, the sound of thunder begins very soon to rise from the ground, and at a distance of fifteen miles can seldom be heard on the earth's surface. It takes a sound wave about eighty seconds to travel fifteen or sixteen miles.

Protection Against Lightning. Lightning in its course to the earth is likely to follow such convenient tall objects as trees; the steeples of churches and the chimneys of houses. According to statistics lightning strikes oaks more often and beeches less often than any other trees. It is also true that single trees standing apart from any other tall objects are more likely to attract lightning than any one tree, no matter what variety, in a forest. It is well to protect buildings with rods, which should be fastened to the roof and any projecting points. The rods should be sunk so low into the earth as to rest in soil which is always damp, or they should be connected with water-pipes or gaspipes which enter the ground.

A person struck by lightning is usually merely stunned or shocked. The shock may be great enough to stop the action of the heart, but it is well to remember that a person apparently killed may have sustained no serious injury. Respiration may have been stopped by a temporary paralysis, but efforts to restore breathing should be continued for at least an hour. The method used after lightning stroke should be exactly the same as after drowning (which see). C.R.M.

Lightning Rod, a stout iron rod, erected on a building for the purpose of receiving lightning and conducting it into the earth to prevent injury to the structure. It is fastened to a building by passing through glass nonconductors, and the lower end is carried into the ground to a considerable depth. Benjamin Franklin invented the lightning rod in 1752. The principle upon which it was devised is that by putting an electrical conductor far enough above buildings to determine the place of a threatened discharge it will carry a lightning bolt to earth without destructive results. In early days the lightning rod was thought to be an impious interference with the wrath of Heaven, evil in principle and doubly sacrilegious if successful. See LIGHTNING.

LIG'NITE. See COAL, subhead *Varieties.*

LI HUNG CHANG, *le' hoong' chahng',* (1822-1901), the "Grand Old Man of China," to whom much of that country's progress during the latter half of the nineteenth century was due. He played the most prominent part in all of China's affairs for over forty years, representing his government and extending its foreign relations with great skill and wisdom. He held the highest official rank of any man in China below the emperor —First Grand Secretary of State. He was born of the people —not of high rank—in the year of General Grant's birth, a fact of which he was always proud. In the severe examinations which admit a man to the literary caste in China he passed ahead of 15,000 competitors. He won his great renown in the service of the Tartar dynasty during the T'aiping Rebellion. During his long service as Viceroy of Chi-li he made his home in Tien-tsin, where he carried on labors which won for him the reputation of being the most progressive man in China.

LI HUNG CHANG

During a visit to Europe Li told Bismarck that he had sometimes been called the Bismarck of the East; the great German statesman is said sincerely to have replied, "I never could hope for the honor of being called the Li Hung Chang of the West." When, in June, 1899, Li Hung Chang returned to China after a visit to the United States he received the order of the Double Dragon, a distinction seldom conferred upon anyone not a member of the royal family. He enjoyed his greatest power from 1874 to 1894, when he was Viceroy of the Metropolitan Province, Superintendent of Northern Trade and the undelegated but recognized Minister of Foreign Affairs. Among the evidences of his far-reaching power is the fact that he controlled all the pawnshops in China, and with one exception outside the royal family, was the richest Chinaman.

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LILAC, *li'lak,* the popular name given to a familiar shrub of the olive family, whose fragrant white or purple-tinted blossoms are a delightful feature of yards and parks in the spring season. The common lilac is one of the ornamental shrubs most frequently used in landscape gardening, and because of its decorative value is cultivated extensively in North America and in Europe. The plant grows from six to fifteen feet in height and flowers in May, the blossoms, of which there are single and double varieties, appearing in large terminal clusters. This plant thrives almost anywhere, but rich loam is most favorable to its successful growth.

LILIUOKALANI, *le le oo o kah lah'ne,* LYDIA KAMEKEHA (1838-), queen of the Hawaiian Islands just previous to the time of their acquisition by the United States. In 1891, on the death of her brother, King Kalakaua, she ascended the throne. Her treatment of non-naturalized whites caused a revolt against her; in 1894 she was deposed and a republic was proclaimed. The new government sought annexation to the United States but met with opposition from President Cleveland, who demanded that the queen be restored to her throne. This was refused by Hawaiian leaders. In 1896 Liliuokalani visited America to press her claims, but on the annexation of Hawaii to the United States in 1898, she returned with a good degree of contentment to her private estate in the islands. She has since been friendly towards the American authorities, but never until after a state of war was declared between the United States and Germany, in April, 1917, would she permit the American flag to be flown from her residence.

LILLE, *leel,* a fortified city in the northern part of France, on the River Deule, situated about seven miles south of the Belgian frontier and 155 miles northeast of Paris. It is the capital of the department of Nord. At the outbreak of the War of the Nations (which see) it was a prosperous center of the French iron industry—a city of beautiful squares and boulevards and modern public buildings. During the invasion of Northern France, in the first year of the war, Lille, with scores of other towns, was captured by the Germans and placed under martial law. A war tribute was levied on the inhabitants and large numbers of them were deported into German territory. As the city was long the scene of furious fighting between the Germans on the one hand and the French, British and Belgians on the other, many of its public buildings were destroyed by the furious bombardments directed against it. Lille has numerous educational institutions and libraries and one of the largest art museums in France outside of Paris. In normal years its factories turn out great quantities of linen, cotton goods, damask, ribbons and laces, spirits, machinery and tobacco products, and the city also has great printing houses, sugar and oil refineries and dye works. In 1911 the population (including suburbs) was 217,807.

LILY, *lil'i,* the common name of one of the largest and most important of plant families. The word popularly refers to such garden and hothouse flowers as the tiger lily, the Madonna lily, and the beautiful white Easter, Mediterranean, Chinese and Japanese lilies. White lilies in all lands are regarded as emblems of purity and innocence.

Julia C. R. Dorr, a poet of the Southern United States, has given this thought poetic expression in the lines—

> And the stately lilies stand
> Fair in the silvery light,
> Like saintly vestals, pale in prayer;
> Their pure breath sanctifies the air,
> As its fragrance fills the night.

To this widely-distributed family also belong those commercially and economically important plants commonly known as onion, garlic, leek, asparagus, aloe, and many others. Typical lilies have tubular or bell-shaped flowers of six parts, with petals often backward curving. In the different species the colors vary from white to scarlet, and are evenly colored or mottled with spots of purple or brown.

Lilies grow from scaly bulbs and send forth bare or leafy upright stems, topped with single blossoms, or with several gayly-nodding flowers in a cluster. Well-drained, deep, sandy loam, sheltered from strong winds and hot summer sun, is best for lily culture. The bulb should be planted six inches or more in depth.

Twelve species of lilies are native to the United States. The calla and the water lily are not included among these, for, though called lilies, they belong to very different families. See illustration on page 3432; also the articles CALLA; EASTER LILY; WATER LILY.

LILY OF THE VALLEY, a favorite garden plant of the northern hemisphere, belonging to the lily family. Its drooping, bell-shaped flowers, of a beautiful, pure-white color, are borne in a long cluster on a slender stem, and possess a delightful fragrance. The flower stalk rises from an underground rootstock, and usually

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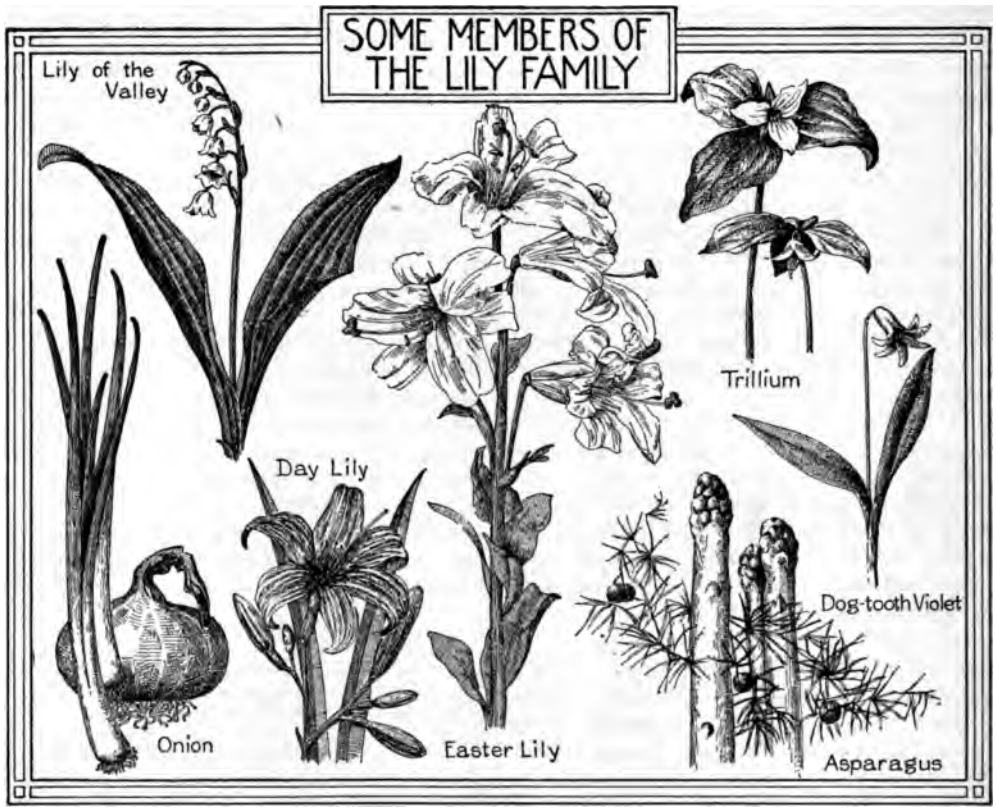

bears two large leaves. It is a perennial plant, flowering naturally in late spring, but blooming in hothouses at all seasons. It thrives in slight shade in a deeply-dug, rich soil containing leaf mold. The lily of the valley, which is the May-flower of the Germans, grows in the woods of Europe and Northern Asia, and in the southern Alleghany region of North America. A French toilet water, called *Eau d'or,* is distilled from the flowers.

LILY OF THE VALLEY

Is not this lily pure?
What fuller can procure
A white so perfect, spotless, clear,
As in this flower doth appear? —QUARLES.

LIMA, *le'ma,* the capital of Peru, is famous in history as the former capital of all Spanish South America, and its name is known even to the uneducated of a great part of the world through the familiar Lima bean, first grown here and named for the city. It is called, poetically, the *City of the Kings*—though it was never the home of any king—being dedicated to the memory of the three "Wise Men of the East" who visited the infant Saviour. The population was said to be 143,500 in 1916.

Lima was founded by Pizarro, the Spanish conqueror, in 1535, whose remains now lie in the magnificent cathedral (see PIZARRO). The city is near the coast, in an almost rainless region, where the air nevertheless is moist with dews and with vapor from the sea. The climate is delightful except in the winter season, June to September.

The city has suffered periodically since 1683 from destructive earthquakes, that of 1746 being especially memorable. As a consequence of the destruction of the Cathedral of San Francisco in that year, the present edifice is a rebuilt and comparatively-modern structure. The architecture of the city is generally of Andalusian type, with Moorish features. There are scores of churches, rich in costly decoration. The Palace, or government building, progres-

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sively constructed, is filled with the accumulated memorials of four centuries and is especially interesting for its great collection of portraits of historic characters. In one of its *patios* (courtyards of buildings) is an ancient fig tree which Pizarro himself planted.

Music, art and belles-lettres are liberally patronized in Lima. The language of the upper class is that of the best circles in Madrid or in Castile. The bullfight, barely tolerated, will soon be seen here no more. Nowhere in South America are Spanish-American character and culture more thoroughly appreciated and esteemed by the representative foreign element than here. The retail trade of Lima is largely in the hands of Italians, who are numerous in the city. There are many Americanized Chinese families, some of which are wealthy and have long been residents of the city.

The Chamber of Commerce is representative of both native and foreign business men, and it exerts a strong influence on the fiscal policy of the nation. Modern sanitation has begun in Lima. The clubs of the city are exclusive and maintain a high standard for membership. The authorized lottery, with public drawings weekly on the Plaza, helps to support the city's charities. The Botanical Garden and the statues of Bolivar, San Martin, Columbus and others are among the attractions of the city. H.M.S.

LIMA, *li'ma,* OHIO, the county seat of Allen County, situated in a rich oil section in the northwestern part of the state, and on the Ottawa River. The city is eighty-one miles south of Toledo and seventy-one miles north of Dayton, and is on the Cincinnati, Hamilton & Dayton, the Detroit, Toledo & Ironton, the Erie, the Lake Erie & Western and the Pennsylvania railroads. It is served by a number of interurban electric lines. The area is five and one-half square miles. The population was 30,508 in 1910; it was 35,384 in 1916, by Federal estimate.

Lima is the seat of Lima College (Lutheran) and of the Ohio State Hospital for the Criminal Insane, which is one of the largest institutions of its kind in the world. In the vicinity are oil wells and refineries, from which vast quantities of oil are shipped. The city has large manufactories of locomotives, cars and machinery, and railroad shops.

LIME, the fruit of a small tree belonging to the rue family, closely related to the lemon. The tree has a crooked trunk, from which spring irregular, spreading branches; it rarely grows higher than eight feet. It has smooth, glossy leaves, like the lemon tree, and the fruit has much the same shape and color as the lemon, but is smaller, more rounded and more sour. The lime tree is a native of India and China, but is cultivated for its fruit in Southern Europe, the West Indies and the southern parts of America. Limes sold in American markets are produced chiefly in Florida and the West Indies. Though the tree grows well in California it is little cultivated there because of its extensive growth in Mexico and the cheapness of the Mexican product. The sharp-biting juice of this lemon-like fruit is the main source of citric acid; it is also much used in making a cooling drink called *limeade,* and as a flavoring. On shipboard it is recommended as a preventive of scurvy. See LEMON.

LIME, a coarse, white, solid substance, formed by "burning" limestone in kilns. Lime is hard and brittle and it will withstand a high degree of heat; however, it can be melted in the intense heat of the electric furnace. Lime has strong alkaline properties; that is, it acts on vegetable and animal substances in the same way that caustic soda and potash do. For this reason it is commonly called *quicklime.* If water is poured upon it lime swells and changes to a fine white powder, forming *slaked lime.* During the process sufficient heat is given off to boil the water. A similar change takes place when lime is exposed to the air for a number of days. The lime absorbs water and carbon dioxide from the atmosphere, forming air-slaked lime, but this lime is worthless for most of the purposes for which water-slaked lime is used.

In the manufacture of lime, the limestone, broken into fragments, is put in at the top of the kiln and the lime is taken out at the bottom. The fire is kept up day and night, and the process may continue for days and weeks, the kiln being charged every few hours. Many limekilns still use wood as fuel; others burn coal, coke or gas. A temperature of about 1,800° F. is necessary to decompose the limestone rapidly.

Uses. Being the cheapest of alkaline substances, lime finds numerous applications in the arts. It is used in making mortar, for whitewash, in the manufacture of bleaching powder, which is chloride of lime, in making modern nitrogenous fertilizers, *lime-niter* (calcium nitrate) and *lime-nitrogen* (calcium cyanamide), and in making cements for buildings and pavements It is also employed for removing the

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hair from hides in tanning, for making certain varieties of glass (which see) and certain fungicides, such as *lime-sulphur* and *Bordeaux mixture,* and for restoring the fertility of soils that have become sour or acid. For this last purpose, however, finely-ground limestone is often better than lime itself. When lime is mixed with sand and the mixture is raised to a high temperature the two fuse and form a liquid glass in which many mineral substances will dissolve; for this reason limestone is employed as a flux in smelting iron ore (see IRON).

Chemistry of Lime. Chemically, limestone and air-slaked lime are calcium carbonate; quicklime is calcium oxide; and water-slaked lime is calcium hydroxide. *Limewater* is a solution of water-slaked lime in water, and *milk of lime* is a mixture of limewater with undissolved slaked lime. Limewater is used in medicine and milk of lime in sugar refining, water purification and many other chemical industries. *Hydraulic lime* has the property of hardening under water, hence the name. See CALCIUM; FERTILIZER. J.F.S.

LIMELIGHT, or **OXYHYDROGEN,** *ok si hi' dro jen,* **LIGHT,** a very intense white light, produced when solid lime, or the oxides of magnesium, thorium, etc., are heated to a high temperature. Limelight is produced by heating the lime with what is known as an oxyhydrogen flame; that is, a flame of hydrogen in an atmosphere of oxygen. The burners are so constructed that the gases are mixed as they issue from a tube having an inverted opening; the flame is of a bluish color, and the point strikes the piece of lime, which soon becomes white-hot. Limelight is used in gas mantles, which are made by soaking a cotton web in a calcium (lime) solution. The cotton burns away, leaving the calcium oxide web. It is also used to a limited extent in stereopticons and for producing lighting effects in theaters where electricity cannot be introduced, but for these purposes ordinary illuminating gas takes the place of the hydrogen.

LIMERICK, *lim' er ik,* fourth in importance among the seaports of Ireland and the leading port on the west coast. It is the capital of Limerick County, and is built on both sides of the Shannon River, about 106 miles south-southwest of Dublin. The town is divided into three parts, the English town, Irish town and Newtown-Pery, the latter dating from 1769, now the finest portion of the city. The industries include the curing of bacon, flax spinning and weaving, and lace making.

In the ninth century Limerick was an important Danish settlement and remained so until the Danes were expelled by the Irish two centuries later. In 1174 the town fell into English hands. Limerick was the last stronghold of James II in Ireland. It surrendered to William III in 1691. By the terms of the treaty of Limerick the greater part of the Irish army was permitted to enlist in the military service of France, and the Roman Catholics were guaranteed full religious and political liberty. The violation of the civil part of this treaty during the reigns of William III and Queen Anne, down to the nineteenth century, has given to Limerick the name of the "City of the Violated Treaty." Population in 1911, 38,403.

LIMERICK, a popular nonsense verse of a special form, supposed to have derived its name from the chorus of an old song of that meter in which the city of Limerick is mentioned. It consists of five lines, the first two and the last rhyming, and the third and fourth. The third and fourth are shorter than the other three, as in this example:

> There was a young man who said, "Why
> Can't I look in my ear with my eye?
> If I give my mind to it
> I know I can do it;
> You never can tell till you try."

Perhaps the best production thus far in print, embodying in it an unusual play on words, is the following:

> One day the great Brooklyn preacher
> Said "That hen is a wonderful creature."
> When the fowl heard of that
> She laid an egg in his hat,
> And thus did the hen reward Beecher.

LIMESTONE. A large part of the earth's crust is composed of a coarse, gray rock and the soil that has been formed from it. If we put small pieces of this rock into any strong acid, especially muriatic acid, bubbles will rise. These bubbles are carbonic-acid gas, and the stone from which they come is limestone, which is a rock composed of this gas and lime. There are many varieties of limestone, and while most of it is of a grayish color, all colors from white, as in statuary marble, to black may be found. Pure limestone sometimes forms in crystals, which from their resemblance to a dog's teeth are given the name of *dog-tooth spar.* Some limestones are composed almost entirely of fossils; when these have been crystallized by heat they form marble (which see).

Limestone was formed by sediment, settling at the bottom of bodies of still water. It usu-

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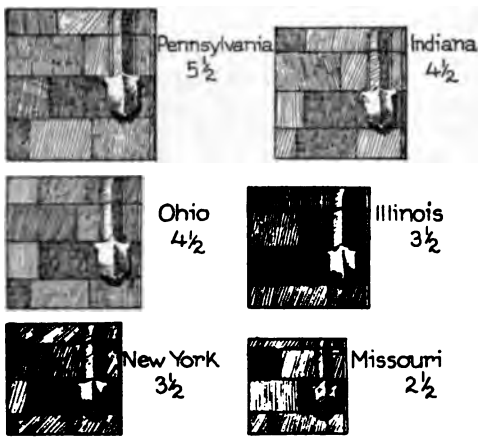
ally occurs in layers, though these layers may have been thrown out of their original position. It is not so hard as granite, but it is strong and is a good stone for foundations and walls where a fine finish is not required. It is



LIMESTONE QUARRYING

The six American states producing the greatest quantities, the figures representing the average for five years ending in 1916.

used in the manufacture of glass, for making lime (which see) and as a flux in smelting iron ore. The lime combines with other minerals in the ore and sets the iron free. For comparison of the durability of limestone and other stone, see BUILDING STONE. W.F.R.

LIMITA'TIONS, STATUTE OF. See subhead, under article DEBT.

LIMOGES, *le mohzh',* in Central France, the famous center of the European porcelain industry, is one of the oldest of French towns. It is the capital of the department (province) of Haute-Vienne, and lies on the Vienne River, 215 miles southwest of Paris. As far back as the Roman conquest (60 B.C.) Limoges was the capital of a Gallic tribe. In the Middle Ages it was famed for its gold ware, and later became a center of the enamel industry. The porcelain industry introduced in the eighteenth century requires the services of 8,000 men. In addition to porcelain factories there are large breweries, distilleries, foundries, paper mills and printing shops; and many people are employed in the manufacture of shoes and clogs. Population, 1911, 92,180.

LIMONITE, *li'mo nite,* or natural *ferric hydrate,* occurs in two forms—bog iron ore and brown hematite. Bog ore is found in marshes and as brown slime in fresh-water lakes, especially in Norway and Sweden, where the gathering and smelting of it is an industry. The hematite is mined in quantities from iron-ore outcrops, particularly in the Appalachian Mountains. Limonite mixed with clay is the basis of ocher and sienna pigments. See HEMATITE.

LIM'PET, a small animal belonging to the mollusks, with an open, conical shell. It is commonly found between the points of high and low tides, clinging to rocks by means of the foot, which acts as a sucker. When the tide is up it searches for food, which consists of different kinds of seaweed, which it gathers into its mouth by means of a long, ribbonlike tongue covered with rows of teeth. As the tide ebbs the limpet returns to its place among the rocks. It clings to objects with such tenacity that a force equal to more than a thousand times its own weight is required to detach it. The common European limpet is eaten by the poorer classes in some parts of Great Britain and is sometimes used as bait by fishermen. Limpets in the tropics grow to be twelve inches in width.

LINCOLN, *ling'kun,* one of the oldest and most interesting towns in England, capital of the county of Lincolnshire, 130 miles by rail northwest of London. It is situated on the banks of the River Witham, and is picturesquely built on the slopes of a hill which rises 200 feet above the river's banks. Besides the cathedral, which is described below, Lincoln has several interesting buildings, such as the remains of the castle built by William the Conqueror in the eleventh century, the building known as John of Gaunt's palace and stables, and several remains from the Roman period of occupation, which began in 55 B.C. Lincoln was an important trading center as early as the Roman era. It is to-day the junction point of six railroads and has extensive waterway communications, but it has lost its former commercial importance. It is the center of a large agricultural district and has im-

LINCOLN CATHEDRAL

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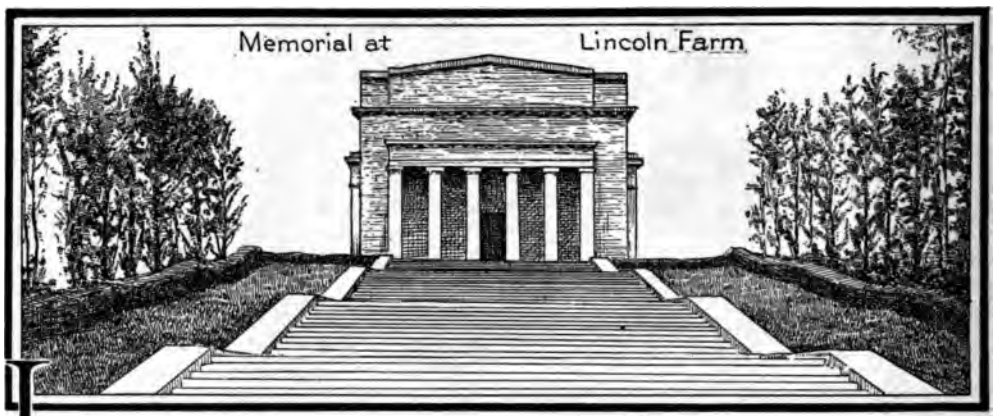
portant cattle and horse fairs. Lincoln has large establishments for the manufacture of agricultural machinery and implements, as well as extensive iron foundries and flour mills.

Lincoln Cathedral. This is the principal building of the city, and towers over it majestically from the crown of the hill upon whose slopes the city is situated. It is the oldest purely Gothic work now in existence, for it was first consecrated in 1092, and is considered one of the finest and most beautiful cathedrals in England. Formerly there were three spires, all of wood or leader timber, rising above the three large square towers which adorn the structure, but the last of these was removed over a century ago. In the great central tower, which is 271 feet high, hangs the bell, called "Great Tom," weighing over five tons, while the two western towers, each 206 feet high, rise nobly above the elaborate screen on the west front. For many years after the Reformation it was not used, but in the nineteenth century extensive repairs were made, and it is now the center of an Episcopal see.



LINCOLN, *ling'kun,* ABRAHAM (1809-1865), the sixteenth President of the United States, one of the heroes of the American people. As the savior of the Union Lincoln stands in history by the side of George Washington, the Father of his Country. He was not merely a statesman, not merely a man who sat in a high place and planned mighty deeds; he was a man whose life seems a part of the national existence. By the gift of that life he preserved the Union, and he gave it ungrudgingly, without a thought of its worth. Victory and death were needed to give Lincoln his imperishable place in history.

His Ancestry. Abraham Lincoln's earliest ancestor in America was one Samuel Lincoln, a weaver, who emigrated from Norfolk, England, in 1637. Samuel Lincoln made his new home in Salem, Mass., but his descendants moved first to New Jersey, next to Pennsylvania, and then to Virginia. In Virginia the Lincolns became fairly prosperous, and in 1780 there is recorded the sale by Abraham Lincoln of 240 acres of land for "five thousand pounds current money of Virginia." After this sale the Lincolns, or Linkhorns, as they sometimes spelled the name, moved to Kentucky. There the danger from Indians was still so great that practically the entire population, about 30,000 people, lived in fifty-two stockades which had been constructed for defense. Abraham Lincoln had three sons, who worked in the clearing with him. One day in 1788 a bullet from an Indian's rifle killed him.

According to the custom and law of the time, the eldest son, Mordecai, inherited most of the father's land, and became a prosperous and respected farmer, besides being a good storyteller and a fierce Indian fighter. Thomas, the youngest son, was only ten years old when his father was killed. His widowed mother moved with him to a neighboring county, where Thomas became a carpenter and cabinetmaker. He was a good workman, but was somewhat shiftless. From time to time he was "taken with spasms of religion;" much of his life he belonged to no denomination, but sometimes he would join two or three in rapid succession. In June, 1806, this carpenter married Nancy Hanks, the niece of Joseph Hanks, in whose shop he had learned his trade. She was a sensitive, melancholy, frail girl, with but little education. A year or two after their marriage, Thomas and Nancy Lincoln moved to

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a small farm in what was then Hardin County and is now La Rue County, Kentucky. Here, on February 12, 1809, was born a son, who was named Abraham, after his grandfather. This Abraham, who was born in a hut and who thus began life under the most inauspicious circum-

ABRAHAM LINCOLN

"A blend of mirth and sadness, smiles and tears;
A quaint 'knight errant' of the pioneers;
A homely hero born of star and sod;
A peasant prince; a masterpiece of God."
—ANON.

stances, became the sixteenth President of the United States.

His Boyhood. The boy began life in what was called a "camp." It was a shelter about fourteen feet square, without a floor, and was made of poles. When Abraham was four years old the family moved to another farm, fifteen miles distant, and in 1816, when he was seven, the wanderlust again seized them, and they moved this time into Indiana, to a new farm in Spencer County. So wild was the country through which the Lincolns passed on this migration that in many places the father had to cut a way through the forest. For a year, winter and summer, the family lived in a half-faced shed, entirely open on one side. In the meantime, Abraham and his father worked on a permanent dwelling, into which they all moved before it was half completed. After this effort Thomas Lincoln relaxed, and for nearly two years made no attempt to finish the house. There were no doors, windows or floor. For chairs there were three-legged stools. The beds were made of poles stuck between the logs in the corner of the cabin, the opposite end of the beds being supported by crotched sticks driven into the ground. Here, in this bare shelter, Nancy Lincoln died in 1818. Her husband made a coffin of green lumber, and taking his children and a few neighbors, himself laid her to rest in the grave. The story is told that nine-year-old Abraham was much disturbed by the lack of proper ceremony, and a few months later, when an itinerant clergyman came that way, the boy induced him to visit the grave and repeat over it the solemn burial rights.

The death of his wife drove Thomas Lincoln to move again, this time back to Kentucky. There he met and married Sarah Bush Johnson, a widow with three children. He had courted her years before, when she was still Sally Bush. The new Mrs. Lincoln was the most prosperous woman the Lincolns had ever known. She brought them furniture, cooking utensils and real bedding. She forced her lazy husband to put a floor and doors in the cabin, and for the first time in their lives Abraham and his sister had something which resembled a home. Mrs. Lincoln also encouraged her stepson in his eagerness to learn. Lincoln's schooling was of the slightest; he once estimated that his entire schooling put together would make about one year. He read the Bible, and his literary style throughout his

HIS BIRTHPLACE

As it now appears. It may be seen in the memorial building on the Lincoln Farm.

life showed that he read it diligently and with understanding. But his favorite books were Aesop's *Fables, Robinson Crusoe, The Pilgrim's Progress* and Weems' *Life of Washington.* By the time he was fourteen he could read and write with ease. He would write with chalk on the cabin walls, or on a piece of

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wood, which he could then whittle clean again. Paper was too precious for daily practice in writing; it was saved for copying extracts from borrowed books. Thus Lincoln managed to learn more than the average boy of the neighborhood, yet when he was elected to Congress and was asked to give the facts of his life for the Dictionary of Congress, he dismissed his early years with two words, "Education defective."

Even as a boy Lincoln won a reputation for witty and forceful speech. He read everything he could lay his hands on. Every wandering preacher was sure to interest one boy in his audience, and every session of the county court

ONE OF HIS EARLY BOYHOOD HOMES

numbered him among the listeners. His knowledge, his humor and his gift for telling stories made him a favorite. His personal appearance encouraged the laughter with which his talk was always met. Tall and "lanky"—he reached his full height, six feet four inches, at seventeen—with a care-free mass of hair—he was, in the words of a contemporary, "the ungodliest sight I ever saw." Naturally he became a satirist, and the man who felt the sting of his sharp retorts was likely to remember them for a long time. In 1831 young Lincoln received his first chance in life. John Hanks, a relative of his mother, engaged him to help take a boatload of provisions and merchandise to New Orleans. Lincoln and his two companions built the boat which carried them down the Mississippi.

Political Ambitions. Only a year later, in March, 1832, Lincoln felt strong enough to announce his candidacy for the Illinois legislature. In an address to the people of Sangamon County he explained his opinions and revealed considerable skill in writing. One of its paragraphs, because of his own limited schooling, is especially noteworthy:

> "Upon the subject of education, not presuming to dictate any plan or system respecting it, I can only say that I view it as the most important subject which we as a people can be engaged in. That every man may receive at least a moderate education, and thereby be enabled to read the histories of his own and other countries, by which he may duly appreciate the value of our free institutions, appears to be an object of vital importance. * *"

While the election was still far away, the Black Hawk War threatened Illinois. Lincoln enlisted at the call for volunteers, and was chosen captain of his company. It is said that the oath of enlistment was administered to Lincoln by Jefferson Davis. The volunteers were mustered out, without having seen any fighting, in May, when Lincoln at once reënlisted as a private. It is a strange coincidence that he was mustered in by Lieut. Robert Anderson, who was in command of Fort Sumter in the critical days of 1860 and 1861. Returning to New Salem in July, Lincoln threw all his energies into the election campaign. Though he was a Whig candidate in a normally Democratic district, he stood third among twelve candidates, and in his own precinct only thirteen votes out of 300 were cast against him.

Lincoln then faced the necessity of earning a living. In the previous year he had served as clerk, but it was because of reputation rather than business experience that he was able to buy a half interest in a general store in New Salem. Lincoln had no money, so he gave his notes in payment. The venture proved disastrous after an uncertain existence of a year, and it took Lincoln fifteen years to pay the debts thus created. In May, 1833, he was appointed postmaster at New Salem; it was not a burdensome position, for the mail came but once a week, on horseback. In after years he was in the habit of saying that he carried the post office in his hat. The position was far from lucrative, and Lincoln was obliged to split rails, and help at the mill, and do any possible work to add to his slender income. In 1834 he served for a time as deputy-surveyor of Sangamon County.

In the same year he was elected to the Illinois house of representatives, in which he sat until 1842. In 1836, when a candidate for reëlection, he made an interesting statement about the right of suffrage:

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"I go for all sharing the privileges of the government who assist in sharing its burdens. Consequently I go for admitting all whites to the right of suffrage who pay taxes or bear arms (by no means excluding females)."

A year later Lincoln issued a public statement regarding his attitude toward slavery. This was a year of great agitation, the year in which the abolitionist Lovejoy was murdered at Alton, Ill. Lincoln put his opinions on record in a protest against certain resolutions passed by the Illinois legislature condemning the abolition movement. Lincoln said that he believed that "the institution of slavery is founded on both injustice and bad policy, but that the promulgation of abolition doctrines tends rather to increase than abate its evils." Moreover, he added his belief that Congress had "no power under the Constitution to interfere with the institution of slavery in the different states."

Lincoln, the Lawyer. While serving in the legislature he continued the study of law, and in 1837 was admitted to the bar. He removed to Springfield in 1839, when that city became the capital of Illinois, and there he formed a partnership with one of the leading lawyers, John T. Stuart. Stuart was active in politics, and left much of the detail of his practice to his new partner. In 1841 Lincoln became the junior partner of ex-Judge Stephen T. Logan, one of the best lawyers in the state. The partnership lasted only two years, being broken because both men sought nomination to the national House of Representatives. Lincoln was defeated, but was elected in 1846, the defeated candidate being Peter Cartwright (which see). During his single term he spoke against slavery and voted for the Wilmot Proviso. At the close of his term, in 1848, he was offered the governorship of the new territory of Oregon, but declined it, so it was said, because his wife refused to go to Oregon with him. He had married Mary Todd, on November 4, 1842.

Lincoln had strongly opposed the Mexican War, an attitude which he felt had practically ruined his political future. At the close of his term in Congress, therefore, he decided to practice law more actively. With an earnest and simple mind, he was strongest in cases in which his client had the fundamental right. He frequently dropped cases after he found that they could be won only on a technicality, and was even known to urge a friend, who was acting jointly with him, to return part of an excessive fee. These characteristics became generally known and added to his personal popularity; they also assured him the sympathetic attention of any judge or jury whom he happened to be addressing.

The Approaching Crisis. Lincoln's return to active political life was the result of the same changes which finally led to the War of Secession. Between 1848 and 1854, though nominally inactive, he was still the foremost of the

HOME IN SPRINGFIELD, ILL.

Illinois Whigs, and when the time came for Stephen A. Douglas to justify the Kansas-Nebraska Bill to the voters of Illinois, Lincoln was the logical man to oppose him. In October, 1854, he answered Douglas at the state fair, at Springfield, in a speech which was so effective that the Abolitionists attempted on the same day to commit him to their cause. A month later his district again sent him to the legislature, but he at once resigned lest there be some question about his eligibility for the United States Senate.

A few ballots in the legislature showed that Lincoln could not be elected, but his friends succeeded in electing Lyman Trumbull, who was a Democrat, but opposed to Douglas' policies. Lincoln was active in organizing the Republican party, and at the first national convention, in 1856, received 110 votes for Vice-President, a compliment to his reputation even before the great debates with Douglas made him a national figure. In 1858 the Republicans nominated him for Senator, to oppose Douglas, who was a candidate to succeed himself. In his speech accepting the nomination Lincoln used language which may have cost him that election, but which prepared the way for a greater prize. He said that—

"A 'house divided against itself cannot stand.' I believe this government cannot endure permanently half slave and half free. I do not expect the Union to be dissolved. I do not expect the house to fall—but I do expect it will cease to be

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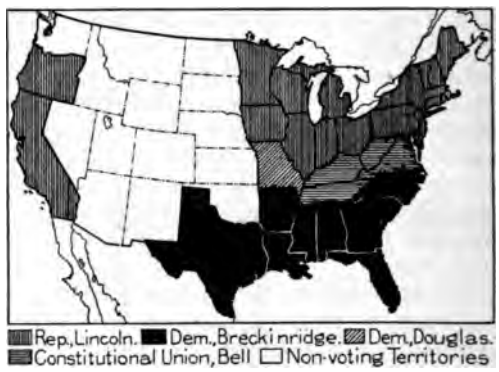
divided. It will become all one thing or all the other. Either the opponents of slavery will arrest the further spread of it, and place it where the public mind shall rest in the belief that it is in the course of ultimate extinction; or its advocates will push it forward, till it shall become alike lawful in all the states, old as well as new—North as well as South."

The Debates with Douglas. After a few preliminary speeches Lincoln challenged Douglas to a series of seven joint debates. The first was held at Ottawa, Ill., on August 21, and the last at Alton, on October 15. Lincoln in debate could hit hard blows. His manner and his mind were earnest, and when his shrill voice trembled with conviction he won the confidence of his hearers in a way that the polished, suave Douglas never did. Horace Greeley, who openly preferred Douglas to Lincoln, said that Lincoln became the foremost *convincer* of his time. In the second debate, at Freeport, Douglas was hard pressed, and was driven to state that "slavery cannot exist a day or an hour anywhere unless it is supported by local police regulations." Douglas succeeded for the moment in reconciling the Dred Scott decision and his own doctrine of squatter sovereignty (which see), and won the Senatorship, but he lost the favor of the South. Douglas' victory had not the slightest effect on his opponent, except possibly to increase his ardor. In 1859 Lincoln made a number of speeches in the Central West, and early in 1860 was invited to speak in New York and other Eastern cities.

The Cooper Union Speech. The joint debates with Douglas had given Lincoln a national reputation. In the East there was great curiosity to see and hear the man who dared to oppose the "Little Giant." The Douglas debates contained so complete a statement of Republican doctrine that the more they were read the more highly was Lincoln regarded. On February 27, 1860, Lincoln spoke at Cooper Union, before a vast crowd. The speech was serious. It had none of the racy quality of a stump speech, and it lacked anecdotes and jests. Lincoln understood his opportunity, and confined himself to a serious presentation of the slavery problem. He especially denied Douglas' views that "our fathers, when they framed the government under which we live understood this question [slavery] just as well and even better than we do now," and by keen historical analysis tore away the supports for Douglas' statement that "the fathers made the country and intended that it should be part slave." Lincoln's words left a profound impression, and at the same time gave the East a more nearly adequate understanding of one of the greatest men in history.

Candidate for President. As early as 1858 there were occasional suggestions from Lincoln's friends that he should become a candidate for the Republican nomination in 1860. Not until a year later, however, did Lincoln



ELECTION RESULTS, 1860

make any open moves to this end. When the Republican convention met at Chicago, in May, 1860, the first choice of the delegates was William H. Seward. Seward, however, had made many opponents by his radical attitude toward slavery, and Lincoln received the support of Indiana and Pennsylvania, two important doubtful states. On the third ballot Lincoln was nominated. In the meantime the Democratic party had split into two wings, although the division did not become hopeless until after the nomination of Lincoln. The Democratic convention met at Charleston on May 3, but adjourned without making a choice. On May 6, John Bell of Tennessee and Edward Everett of Massachusetts were nominated by the Constitutional Union party (which see). The Democrats met again at Baltimore in June and nominated Douglas, but the Southern Democrats left the convention and later nominated John C. Breckinridge for President.

Thus there were four tickets in the field. The two Democratic candidates were men of long experience and sound reputation in national politics. Lincoln, on the other hand, in spite of the Douglas debates, the great speech at Cooper Union and his long leadership in Illinois politics, was not sufficiently tested to suit many of the leaders of his party. Charles Francis Adams, whom Lincoln appointed minister to Great Britain, said after Lincoln's death

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that "in the history of our government, down to this hour, no experiment so rash has ever been made as that of elevating to the head of affairs a man with so little previous preparation for his task as Mr. Lincoln." And Wendell Phillips asked, "Who is this buckster in politics? Who is this country advocate?" Lincoln declined to make an active canvass, a course which was justified by the result. Lincoln and Douglas divided almost the entire vote of the North, Breckinridge and Bell almost the whole of the South. For the first time since the founding of the republic a President was elected without an electoral vote from a slave state. Lincoln had 180 electoral votes to 72 for Breckinridge, 39 for Bell and 12 for Douglas. The popular vote was 1,866,452 for Lincoln, 1,375,157 for Douglas, 847,953 for Breckinridge and 590,631 for Bell. Lincoln was nearly a million short of a majority.

The Administration of Lincoln

The Crisis. The events between Lincoln's election and his inauguration were the opening steps in the War of Secession (which see). In October South Carolina had sent circulars to the governors of the other Southern states, and in November, immediately after the election, herself seceded. It was the purpose of the Southern leaders to confront Lincoln, at his inauguration, with a confederacy in actual existence. On February 8, 1861, a constitution was adopted by delegates at Montgomery, Ala., and on the following day Jefferson Davis was elected President. On February 9 Lincoln started from Springfield, Ill., for Washington. He made frequent speeches on the way until he reached Harrisburg, Pa., where his plans were suddenly changed by evidence of a plot to assassinate him in Baltimore. The remainder of the trip Lincoln made hurriedly and in secret, reaching Washington on the morning of February 23. In spite of some threats and fears, the inauguration passed without disturbance. Seated near Lincoln on the platform were James Buchanan and Stephen A. Douglas, and the oath of office was administered by Chief Justice Taney, the author of the Dred Scott decision.

On the day following his inauguration Lincoln learned that Fort Sumter must soon fall if not reënforced. Notice was sent to General Beauregard, then commanding the Confederate forces before the fort, that provisions would be sent to the besieged, if possible. On April 11 Beauregard demanded the surrender of the fort, which was abandoned after a slight bombardment. The capture of Fort Sumter was the beginning of war, and filled both North and South with excitement. The military events of the next four years are given in detail elsewhere (see WAR OF SECESSION), and they will be mentioned here only incidentally.

The Lincoln Cabinet comprised chiefly defeated candidates for the Republican nomination for President. William H. Seward, as Secretary of State; Salmon R. Chase, Secretary of the Treasury; Simon Cameron, Secretary of War; and Edward Bates, Attorney-General, were its leading members. The variety of views held by these men added to the strain on Lincoln.

During the next four years the one thing uppermost in the minds of the people of the United States was war. The conduct of the government was subordinated to one purpose, the successful prosecution of the war. The Battle of Bull Run, on July 21, 1861, was the first great shock which Lincoln and the North had to endure. The Federal army not merely failed in its attack, but was defeated and hurled back to the Potomac. The North was in despair; the South, all confidence and joy. After the battle General McClellan was given command of the Army of the Potomac, and while McClellan drilled the army Lincoln kept up the fight for the conciliation of the border states and the solidarity of the North. In the late summer of 1861 Lincoln was troubled by the action of General Fremont, who crowned his exploits in Missouri by a proclamation confiscating property and liberating slaves. This action the President disapproved; he would permit no step toward emancipation, except for those who were doing military service in the Confederate armies.

Mason and Slidell Incident. Another episode which threatened serious trouble was the Mason and Slidell episode. Mason and Slidell were Confederate envoys to Great Britain and France, respectively. They ran the blockade at Charleston, went to Havana, and sailed from there on the British steamer *Trent*. Captain Wilkes, of the United States sloop *San Jacinto*, took the envoys off the *Trent*, to the intense joy of the North. But the British government demanded an apology and the release of the two men, and made preparations for war. As

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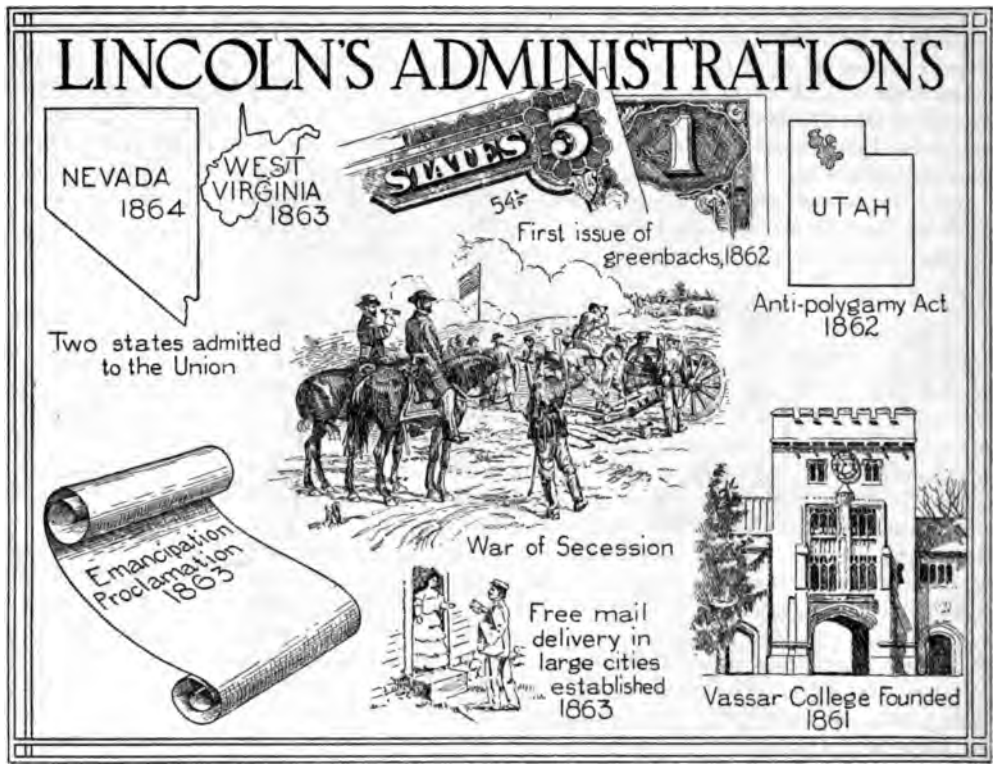

Lincoln said on the day he heard of the seizure, the United States fought Great Britain in 1812 because the latter insisted on doing what Captain Wilkes did. Lincoln recognized that Captain Wilkes was in the wrong, and admitted the fact.

Emancipation of the Slaves. The indecisive military campaigns of 1861 and the summer of 1862 were trying days for Lincoln. The political outlook, too, was gloomy, for there was still a possibility of European interference on behalf of the Confederacy. Under these discouraging circumstances Lincoln was maturing a plan for the emancipation of negro slaves. In April, 1862, Congress purchased and freed all slaves in the District of Columbia, and two months later abolished slavery throughout the public domain. On September 22, 1862, after the Battle of Antietam, the President issued a preliminary proclamation of emancipation, warning the seceded states that unless they returned to the Union by January 1, 1863, all slaves would be declared free.

Lincoln was in favor of compensated emancipation; he believed that the slaveholders should be paid, but the border states were opposed to the plan. Lincoln knew, too, that emancipation might cost the support of the border states, might cause desertions from the army, and in any case could mean nothing unless it were followed by Federal victory. By July, 1862, however, Lincoln's opinion was fixed, and the proclamation was held to await a Federal victory. Antietam was indecisive, but it was technically a victory, and was sufficient excuse for the proclamation. On the afternoon of January 1, 1863, with a few joking remarks about the trembling of his hand, Lincoln signed the formal Emancipation Proclamation which declared that all slaves held in states then in rebellion should be free, and that the United States government should "maintain the freedom of such persons."

The Turning of the Tide. The year 1863, although in many ways dark for Lincoln, was marked by signs which foretold the end of the war. After McClellan failed to take advantage of his opportunities at Antietam, Burnside held command until the defeat at Fredericksburg. Then Hooker acted as chief and lost the Battle of Chancellorsville. This was perhaps the lowest point of the Federal fortunes. Soon after, Meade halted Lee at Gettysburg, where the three-days' battle ended the possi-

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OUTLINE AND QUESTIONS ON ABRAHAM LINCOLN

Outline

I. Early Life

(1) Birth and parentage
(2) The family mode of life
(3) Lack of formal education

II. Becoming Well Known

(1) Candidacy for legislature of Illinois
(2) In Black Hawk War
(3) In Illinois house of representatives
(4) As a lawyer
(5) In the national House
(6) The Lincoln-Douglas debates
(7) Candidate for Presidency
  (a) Election of 1860
    1. Candidates
    2. Issues
    3. Result

III. His Administrations

(1) Outbreak of War of Secession
  (a) Fall of Fort Sumter
  (b) First call for volunteers
(2) Effect on country of Battle of Bull Run
(3) Foreign entanglements
  (a) The *Trent* affair
(4) Emancipation Proclamation
  (a) A war measure only
  (b) Applied to states in actual rebellion
(5) Disturbing domestic conditions
  (a) The Copperheads
  (b) Suspension of habeas corpus
  (c) Draft riots
  (d) National Banking Act
  (e) Desperate need in South
(6) The turning of the tide
  (a) Gettysburg and Vicksburg
    1. Gettysburg oration
(7) Election of 1864
  (a) Candidates
  (b) Issues
  (c) Result
    1. The great second inaugural address
(8) The surrender of Lee and close of the war
(9) Assassination of the President

IV. Character

(1) Claims to greatness
(2) Increasing fame

Questions

Why is Lincoln accounted with justice one of the greatest men who ever lived?

How do the boyhood and youth of Lincoln compare with those of the man who became Vice-President with him? With those of Garfield?

What did Lincoln's earliest home look like? What did that in which he lived when he was nine years old?

Who brought into his life the first really civilizing, refining influences?

Describe his appearance when he was seventeen years old.

What was his attitude toward education, and when was it expressed?

What military experience did he have?

During his young manhood, what was his attitude toward slavery?

If you had had a law case in Lincoln's day, why might you have wanted to entrust it to him?

Why did Lincoln make the latter part of his trip to Washington hurriedly and in secret?

Under what circumstances did Lincoln frankly admit that the South was wrong?

Why did he not issue the Emancipation Proclamation as soon as he had made up his mind that it should be done?

Who were the "Copperheads," and what part did they play in history?

What was the lowest point of the Federal fortunes? What marked the turning of the tide?

What does *sic semper tyrannis* mean, and when was it used?

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bility of Confederate invasion of the North, and on July 4, 1863, Grant captured Vicksburg. On November 19, 1863, Lincoln spoke at the dedication of the national cemetery at Gettysburg. The orator of the day was Edward Everett, a polished speaker, whose address was a model of oratorical excellence. Lincoln had scrawled the notes for his three-minute speech on an envelope. He felt, like most of those who heard the speech, that his words added nothing to the occasion, but history has proved him wrong. The Gettysburg Address is one of the noblest gems in the English language, and its words will survive when even the names of Edward Everett and the others who participated in the ceremonies shall have been forgotten. (For text, see GETTYSBURG, BATTLE OF.)

After Gettysburg came another change of Federal commanders, for Meade failed to hammer Lee as Lincoln thought it should be done. The man who succeeded Meade was General U. S. Grant. When Grant took command, the Federal armies numbered about 975,000 men; the Confederates were about half that number. Grant's persistent pounding spelled doom for the weaker forces of the Confederacy, and on April 9, 1865, he received the surrender of General Lee's army at Appomattox Court House. It is interesting to note that in allowing the Confederate officers to keep their side-arms and horses Grant was exceeding Lincoln's instructions, but when Lincoln heard the terms of surrender he expressed great satisfaction.

Renomination and Reëlection. Early in 1864 Lincoln began to give less attention to military matters, and more to political affairs. The appointment of Grant, Sherman and Sheridan to the highest commands was followed by a change in Lincoln's attitude. Hitherto he had never given the Federal commanders the highest confidence, but henceforth he disclosed a justifiable trust in the judgment of his army leaders. The dress-parade commanders were all gone, and in their places were fighters. Lincoln's position towards Grant is set forth in a letter to him, dated April 30, 1864:

"Not expecting to see you again before the spring campaign opens, I wish to express in this way my entire satisfaction with what you have done up to this time, so far as I understand it. The particulars of your plans I neither know nor seek to know. You are vigilant and self-reliant, I wish not to obtrude any constraints or restraints upon you. While I am very anxious that any great disaster or capture of our men in great numbers shall be avoided, I know these points are less likely to escape your attention than they would mine. If there is anything wanting which is within my power to give, do not fail to let me know it."

With confidence in his generals Lincoln gave much of his time to efforts for securing his renomination and reëlection. In his own party there was strong opposition from Salmon P. Chase and John C. Fremont, and skilful political maneuvering was required to eliminate these men. The Democrats nominated General McClellan on a platform declaring the President's war policy a failure and demanding peace. Before election day Farragut had entered Mobile Bay and Sherman had captured Atlanta. "Sherman and Farragut," said Seward, "have knocked the planks out of the Chicago platform"—the platform which declared the war a failure. To these exploits should be added Sheridan's picturesque victory in the Shenandoah campaign. Sheridan's message to Grant—"We have just sent them whirling through Winchester, and we are after them to-morrow"—thrilled the North and demolished what still remained of the Democratic platform. Lincoln's electoral vote was 212, against 21 for McClellan. The latter carried New Jersey, Delaware and Kentucky; Lincoln carried all the rest, including West Virginia, which had been admitted to the Union on June 19, 1863. The popular vote was much closer, being 2,330,552 for Lincoln to 1,835,985 for McClellan.

Victory and Death. Before the election Lincoln had labored in vain to secure from Congress a favorable vote on the Thirteenth Amendment, forever prohibiting slavery, but not until January, 1865, was the vote obtained. The adoption of this amendment removed all possibility of questioning the constitutionality of the Emancipation Proclamation. Early in February Lincoln suggested to his Cabinet that Congress be asked to appropriate $400,000,000 to compensate the owners of slaves in such of the Southern states as should have ceased resistance by April 1, but this proposal was unanimously disapproved by the Cabinet. It was a sign of Lincoln's conciliatory attitude toward the South, an attitude which found its noblest expression in the imperishable words of the second inaugural address. The closing sentence is one of the most frequently quoted sentences in the English language:

"With malice toward none, with charity for all, with firmness in the right as God gives us to see the right, let us strive on to finish the work we are in; to bind up the nation's wounds, to care for him who shall have borne the battle, and for his widow, and for his orphan—to do all which

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may achieve and cherish a just and lasting peace among ourselves, and with all nations."

General Lee surrendered on April 9, 1865. Five days later, on Good Friday, April 14, General Grant arrived in Washington, and attended a Cabinet meeting at which reconstruction was the chief subject under discussion. On the evening of that day President Lincoln attended a performance of *Our American Cousin* at Ford's Theater. A few minutes after ten o'clock a shot rang through the crowded house. John Wilkes Booth, a half-crazed actor, had shot the President through the head. Leaping to the stage from the President's box, Booth caught his spur in the folds of the American flag. He fell and broke his leg, but limped across the stage, while he brandished a dagger and cried, "Sic semper tyrannis" (thus ever to tyrants), the motto of Virginia (see BOOTH, subhead *John Wilkes Booth*). The bullet entered Lincoln's brain, and he did not regain consciousness. He was carried to a neighboring house, where he died at twenty-two minutes past seven on the morning of the next day, April 15, 1865.

FORD'S THEATER
Building in which President Lincoln was assassinated.

The immediate result of Lincoln's tragic death was a sudden cessation of the bitter criticism which he had borne for four years. The funeral was on the nineteenth. Behind the coffin, at the head of the line, marched a detachment of negro troops. During those sad days all business was suspended; never before had a nation so deeply mourned. The progress of the special funeral train from Washington to Springfield, Ill., where the body rests, was marked by endless lines of sorrowing people. Now poets, editors and orators sing his praises. This simple man, sprung from the soil, descendant of a poor, even shiftless stock, had risen to the highest place in the nation, and had wielded dictatorial power. The United States, never before in its history,

Lincoln's Birthday

SUGGESTIVE PROGRAMS

Let us have faith that right makes might; and in that faith let us to the end dare to do our duty as we understand it.
—*Lincoln*

I

Song, *Battle Hymn of the Republic*... .....*Howe*
Flag Salute
O Captain! My Captain.....*Whitman*
"Chalk Talk"—Drawing of cabin in which Lincoln was born, with story of his childhood
Lincoln .....*Longfellow*
Essay, *The Boyhood of Lincoln*
Lincoln, from the *Commemoration Ode* .....*Harriet Monroe*
Essay, *Lincoln's Rise to the Presidency*
Second Inaugural Address.....*Lincoln*
Essay, *The Years in the White House*
The Moral Warfare.....*Whittier*

II

Song, *Liberty's Banner*..... .....Music from Verdi's *Anvil Chorus*
Quotations about Lincoln
Patriot Sons.....*Samuel F. Smith*
The Hand of Lincoln.....*E. C. Stedman*
The Gettysburg Oration.....*Lincoln*
Lincoln, from the *Commemoration Ode* .....*Lowell*
Essay, *Lincoln's Kindness of Heart*
On the Life Mask of Abraham Lincoln .....*Richard W. Gilder*
Selections from *Abraham Lincoln*..... .....*R. H. Stoddard*
Quotations from Lincoln
Lincoln's Grave.....*Maurice Thompson*
Conclusion of *The Building of the Ship* ..... *Longfellow*

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allowed any President as much power as Lincoln wielded. Yet he never lost his sense of proportion. Phillips Brooks said of him: "There are men as good as he, but they do bad things. There are men as intelligent as he, but they do foolish things. In him goodness and intelligence combined and made their best result of wisdom." W.F.Z.

Consult Baldwin's "Abraham Lincoln," in *Four Great Americans;* Morgan's *Abraham Lincoln, the Boy and the Man;* Creelman's *Why We Love Lincoln;* Craven's *Story of Lincoln, for Children;* Tarbell's *Life of Lincoln.*

LINCOLN, Robert Todd (1843-), the oldest son of Abraham Lincoln, and himself a noteworthy figure in American political and business life. He was born in Springfield, Ill., where his father was then practicing law. Being ambitious to follow the same profession, he entered Harvard Law School, after being graduated from Harvard University; but the War of Secession broke out almost immediately, and he at once volunteered. Under his father's good friend, General Grant, the young man served as captain until the war was over. He then resumed his law studies, was admitted to the bar in 1867 and practiced in Chicago until 1881. In that year he was called to Garfield's Cabinet as Secretary of War, in which post he continued under President Arthur; later he served as minister to England by appointment of President Harrison in 1889, returning home four years later. At the close of the Harrison administration in 1893 he withdrew from public life and became counsel for the Pullman Company. Four years later he succeeded to the presidency of that company, upon the death of George M. Pullman. This position he resigned in 1911, becoming chairman of the board of directors.

LINCOLN, Ill., an industrial city of Central Illinois and the county seat of Logan County, twenty-nine miles northeast of Springfield and 150 miles southwest of Chicago. It is on the Chicago & Alton and the Illinois Central railroads and on the Illinois Traction System. In 1910 the population was 10,892; in 1916 it was 11,838 (Federal estimate). Lincoln is the seat of Lincoln College, which since 1901 has been affiliated with James Millikin University (Presbyterian) at Decatur. The city has a Carnegie Library, the state school and colony for feeble-minded children, an Odd Fellows Orphans' Home, Deaconess' Home and Hospital and Saint Clara's Hospital. The industrial establishments of the city include coal mines, large greenhouses, flour mills, creameries and manufactories of electric automobile-signal horns, shoes, corn-cutting machinery, mattresses, horse collars, caskets and cigars.

Abraham Lincoln, for whom the town was named, helped to plat the settlement, which was done in 1835. The place was incorporated in 1854. The commission form of government was adopted in 1915. One of the most interesting features of the town is the old courthouse in which Lincoln practiced law.

LINCOLN, Neb., the capital and the second largest city of the state, ranking next to Omaha, and the county seat of Lancaster County. It is fifty-five miles southwest of Omaha, 200 miles northwest of Kansas City and 500 miles east and north of Denver, and is on the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, the Missouri Pacific, the Chicago & North Western and the Union Pacific railroads. Several interurban lines extend to suburbs. The population, including a considerable number of Scandinavians, Italians, Greeks and Poles, was 43,973 in 1910; it had increased to 46,515 in 1916 (Federal estimate). The area of the city is about eight square miles.

Lincoln is situated on rolling prairie land which slopes gradually north and west, and is drained by the Salt Creek, a tributary of the Platte River. The surrounding country is agricultural. Among the principal parks are Antelope, covering 121 acres, and Lincoln, five acres. A fine monument to Abraham Lincoln was made for the city by the sculptor Daniel C. French. Two miles southwest is Epworth League Park, where a Chautauqua is held annually. Near the city are the state fair grounds.

Institutions. Lincoln is the seat of the University of Nebraska (see Nebraska, University of), which is located in the heart of the city. Nebraska Wesleyan University and Conservatory of Music are at University Place, an adjoining suburb; Union College (Seventh Day Adventist) is at College View, Cotner University (Disciples of Christ) is at Bethany. Lincoln is well supplied with libraries,—the university, the state, the state historical and two city libraries. The state penitentiary and the state hospital for the insane are located here, and among a number of benevolent and charitable institutions are Saint Elizabeth's Hospital and the Home for the Friendless.

Public Buildings. Prominent buildings include the state capitol, constructed at a cost of

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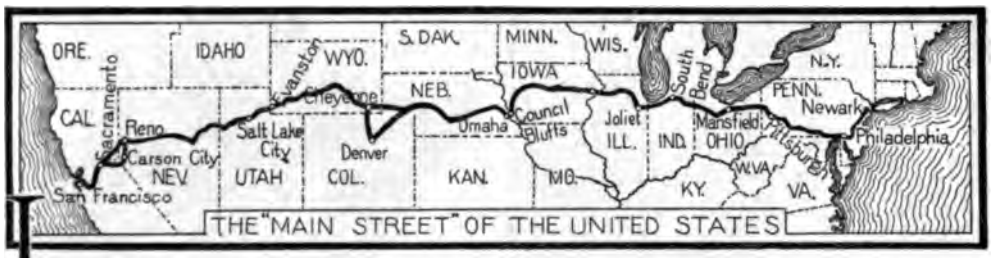
$500,000; a Federal building, county courthouse, Carnegie Library, the Scottish Rite Masonic Temple, Commercial Club Building, Y. M. C. A. and Y. W. C. A. buildings.

Industry. Lincoln is the trade and supply center for a large surrounding territory. There are more than one hundred wholesale houses, and the city stands high among places of its size in the distribution of fruit, live poultry, groceries and farm implements. The largest industrial establishments include the large Burlington shops (which employ 1,110 mechanics) at Havelock, a suburb east of the city; a creamery, said to be the largest in the world; grain elevators, a seed farm and manufactories of paint, corsets, gasoline engines, irrigation supplies, upholstered goods, mattresses, brooms and dusters, overalls and shirts, saddles and harness, sashes and doors.

History. Settlers were first attracted to this vicinity by the salt springs. The town of Lancaster was organized in 1862, when there were but few inhabitants, and in 1867, with a population of thirty, the place was chosen as the state capital and the name changed in honor of Abraham Lincoln. In 1913 the commission form of government was adopted. Lincoln is the home of William Jennings Bryan.



LINCOLN HIGHWAY, a road for vehicles, extending entirely across the northern part of the United States, its eastern terminus across the Hudson River from New York City, in New Jersey, its western at San Francisco. It is named in honor of Abraham Lincoln; its object is to provide a practically perfect highway across the continent and to encourage good road-building in all of the states of the American Union.

It has for many years been the boast of France that a person can walk along almost any road from one end of the republic to the other without wetting his feet. France has been densely populated for many hundred years; it is much smaller than the state of Texas, and is only twice as large as the entire state of Colorado. Road-building in a small area presents few difficulties such as attend like labor in a country so vast and so thinly settled as is a considerable part of the United States.

Most of the Eastern states of the Union possess remarkably good roads; their populations are dense, the people travel much, and money appropriations have been freely made for highway improvement. The West is helpless, so far as the building of hard-surfaced roads is concerned. To reach the Pacific coast one must pass through states where for miles one sees no human habitation. The state of Nevada has a population of less than one person to the square mile and an area more than half as large as that of France; it is manifestly impossible to expect the inhabitants of such a section, no matter what their desires may be, to bear the extremely-heavy expense of constructing even one hard-surfaced road through the state.

In 1912 a group of men headed by Carl H. Fisher of Indianapolis proposed that a national road should be built across the country and paid for by voluntary contributions and local appropriations. It was believed that if the good effects of one thoroughly-good highway could be made apparent it would hasten the day when America's two million miles of unimproved roads would cease to be more or less of a disgrace to the various communities.

An association was organized, with headquarters at Detroit, late in 1913. The shortest and most practicable route across the continent was selected, and the labor of securing funds was begun in all localities along the line. The response exceeded expectations. The President of the United States in touring the country in 1912 gave the project a strong unofficial endorsement when he said, "One reason I am in favor of good roads is because they wipe out sectionalism; they tend toward a national unity of thought and sentiment."

Personal contributions and local, state, county and city appropriations assured the suc-

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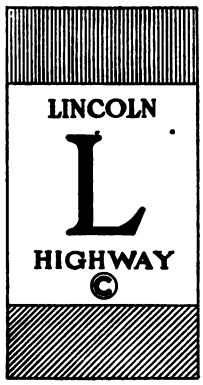
cess of the enterprise. The Lincoln Highway, as marked for its entire length, is 3,331 miles long, and is the longest connecting roadway in the world. It has been marked for practically its entire length with conspicuous red, white and blue signs. Many towns and cities have renamed the local street through which this road passes, now calling it "Lincoln Highway."



THE GUIDE ALONG THE ROUTE

Some of the thirteen states traversed by the Lincoln Highway are already marked from end to end. The official marker, copyrighted, stands twenty-one inches high and consists of a strip of red three inches high at the top, a white band twenty-one inches wide and a strip of blue three inches below. On the white background in blue there is a large letter "L" and the words "Lincoln Highway" in smaller type. This marker is painted on telegraph poles, barns, fences or whatever is available, and can be seen readily by the tourist. There will be a marker every 200 feet in addition to those placed at railroad crossings and sharp corners on the highway.

From Jersey City the road extends almost straight southwest to Philadelphia, then west across Pennsylvania, Northern Ohio and Indiana, passes twenty-five miles south of Chicago, west through Northern Illinois and Central Iowa, with an abrupt turn to Council Bluffs, thence due west through Nebraska and Wyoming, with a triangular loop to Denver, then southwest through Northern Utah, west and south through Nevada, and thence to San Francisco (see map, in panel at the head of this article).

At the Panama-Pacific International Exposition in San Francisco in 1916 there was a remarkable statue of a Plains Indian on horseback, horse and rider wearied to the point of exhaustion. This statue, called "The End of the Trail," will be erected at the western terminus of the Highway, on the San Francisco Bay shore.

As expected, the publicity given the Lincoln Highway, and the enthusiasm with which the project was received throughout the entire route, has inspired many other large road-building projects. The most conspicuous of these is the Dixie Highway, originally designed to extend from Chicago to Southern Florida, but later extended into Northern Michigan. The South has been earnest in the development of this road. It is described in full under its own title in these volumes.

Possibly the next in importance among the long routes, either proposed or under construction, is the Jackson Highway, extending from Minneapolis through the states of Iowa, Missouri, Arkansas and Louisiana, with its southern terminus at New Orleans; a branch will reach Dallas, Texas. A dozen other projects, somewhat less ambitious but fully as important to the sections affected, may all be said to be the result of the original agitation in connection with the Lincoln Highway. E.D.F.

"THE END OF THE TRAIL"

LIND, Jenny (1820-1887), known in private life as Madame Otto Goldschmidt, was a famous soprano, "one of the finest pearls in the world's chaplet of song," in the words of Meyerbeer. Jenny Lind was born in Stockholm, Sweden; studied in Paris under Signor Garcia; subsequently became a member of the Royal Swedish Academy of Music in her native city, and in 1840 was appointed court-singer. Her first appearance as an opera singer was made as *Norma,* in which part she electrified her audience. In 1845 she sang before Queen Victoria of England, who was visiting at Bonn. The following year, when she sang in Vienna, her popularity increased. On the last evening of her engagement thousands of people thronged beside her carriage and escorted her home, and she was obliged to appear at her window thirty times to acknowledge the applause of the crowds. In 1847 she made her first London appearance, at Covent Garden, where she was received with enthusiasm. The

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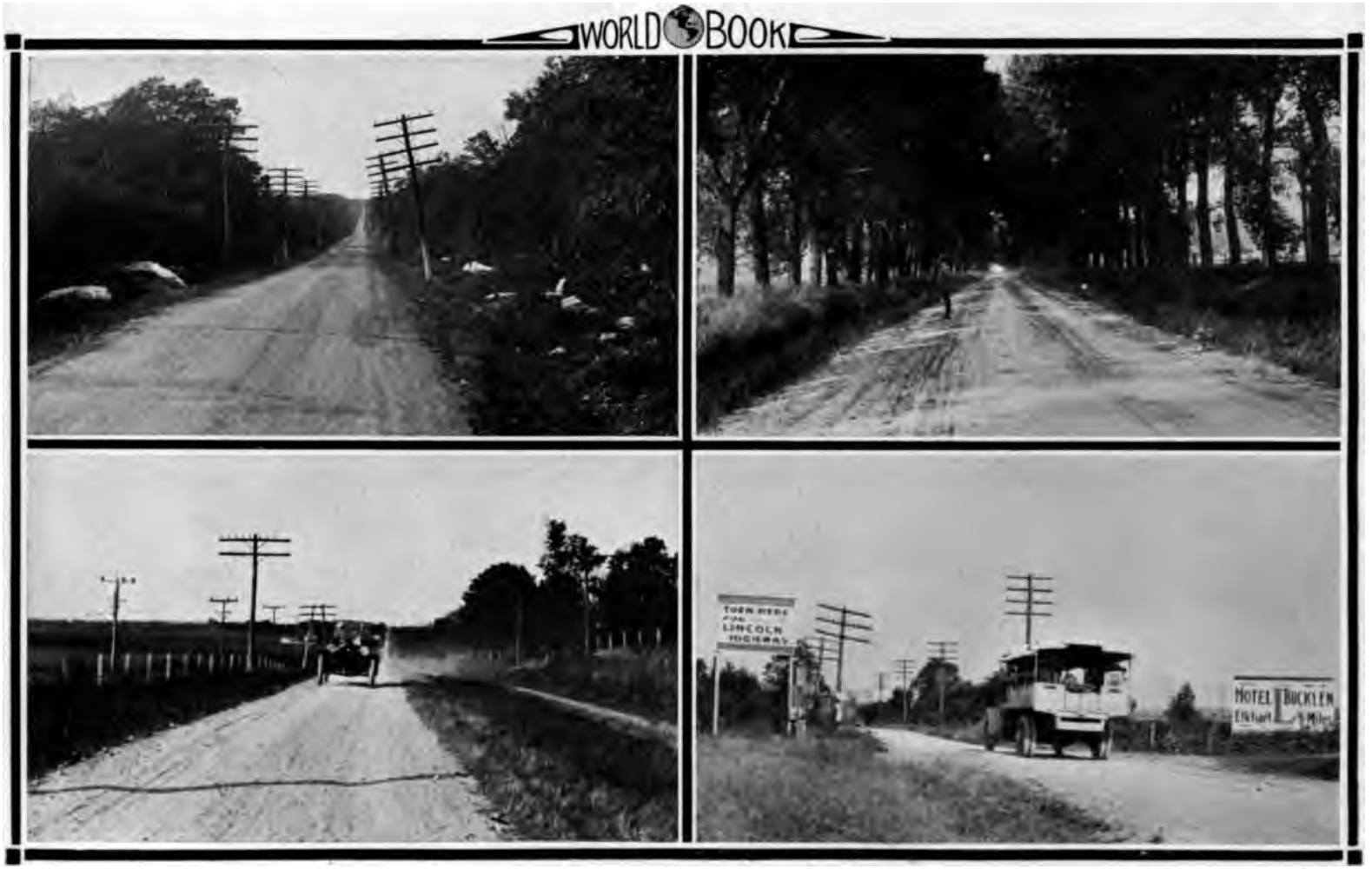

ON THE LINCOLN HIGHWAY.

At top: Left, a seven-mile stretch in Pennsylvania, at summit of the Alleghenies; right, a shady section in Iowa. At bottom: Left, an Illinois gravel road; right, in Northern Indiana.

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ON THE LINCOLN HIGHWAY.

At top: Left, through the wonderland of Wyoming; right, in the desert in Nevada. At bottom: Left, passing Donner Lake, California; right, the half-way mark, in Nebraska.

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queen would have showered valuable gifts upon her, but she accepted nothing but a bracelet, which she always treasured.

In 1850 she visited the United States under the management of P. T. Barnum, and toured the country for nearly two years. She sang in a hundred concerts, and created unprecedented enthusiasm wherever she went. She was paid $1,000 a night for 150 nights; friends of Barnum predicted his ruin because of such a contract, but his receipts were $700,000, and people fought for opportunity to secure choice seats—sometimes at auction prices. In February, 1852, in Boston, she was married to her accompanist, Mr. Otto Goldschmidt. When her husband became leader of the Bach choir in London Madame Goldschmidt sang frequently in oratorios and concerts. She made her last appearance at a concert for charity at Malvern in 1883.

LIN'DEN, the name given in Europe to a large, handsome forest tree more popularly known in America as *basswood*. It is described under that title in these books.

LINDSAY, *lin'zi,* the county town of Victoria County, Ontario, on the Grand Trunk and Canadian Pacific railways, sixty-nine miles northeast of Toronto. Lindsay is also on the Scugog River, which is navigable and provides steamer connection with the Trent Canal. The town has a large trade in lumber, grain and flour, and among other things manufactures doors, sashes and other lumber products, boots and shoes, agricultural implements and carriages. The county buildings are conspicuous, as are also the collegiate institute and a Roman Catholic convent. Population in 1911, 6,964; in 1916, about 7,500.

LINDSEY, BENJAMIN BARR (1869-), an American judge who has attracted widespread attention through his work intended to improve the relations between the law and youthful offenders. He is the originator of the leading features of juvenile courts (which see), and is an authority on methods of dealing with the delinquency of boys.

Judge Lindsey was born in Jackson, Tenn., where he attended the public schools. In Denver, Colo., while working in a real-estate office, he read law in his spare hours, and after making a name for himself in this profession, he was elected judge of the Denver juvenile court (1901). In that capacity he introduced the feature of putting boys on their honor, and also originated many other improvements in the handling of youthful transgressors.

For several two-year terms he was returned to the office, but his reëlection in 1913 was marked by a most bitter campaign. This was due to his denunciation of the system which extends privileges and monopolies to a few and denies common rights to the many (which he says is the cause of involuntary poverty). His courageous stand made him the object of violent attacks, but he succeeded in holding the confidence and respect of the public.

BENJAMIN B. LINDSEY

Judge Lindsey has conclusively proved the value of the probation system, and especially that of private hearings by a wise and sympathetic judge. He is the author of *Colorado Juvenile Court Law, Problems of the Children, The Beast and the Jungle, The Rule of Plutocracy in Colorado* and other writings.

In 1915 he was a member of the party which embarked on a futile mission, under the direction of Henry Ford (which see), to bring peace to the warring nations of Europe. Judge Lindsey's reputation is so firmly established in Europe that he was a conspicuous figure in every European city he visited.

Consult Steffins's *Upbuilders.*

LINE, a continuous extension, purely imaginary, of length without breadth or thickness. It may be described as the track of a moving point. Lines may be parallel, oblique, perpendicular, or tangential; they may be straight, curved, broken or mixed. A broken line is a number of straight lines, a mixed line is a number of straight and curved lines. See GEOMETRY.

LIN'EN, a superior kind of cloth woven from the fibers of flax, which provides mankind with a wonderful variety of strong and useful fabrics. In daily use in the home are linen towels, bedding, tablecloths and napkins; linen dresses, shirts, collars, cuffs and handkerchiefs are familiar articles of apparel; and there are so many other ways in which the cloth is used we may say with truth that we have it with us all day long and throughout our lives.

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Linen is famed for its durability. Specimens still well preserved are occasionally found in Egyptian mummy cases over 4,000 years old. Both the Egyptian and Jewish priests wore linen garments at their religious ceremonies, and the use and manufacture of the cloth passed from Egypt to Greece at a very early date. Greek men were wearing linen tunics when Homer composed the *Iliad* and the *Odyssey*. The Romans, true to their habit of borrowing whatever seemed worth while, acquired from their Greek neighbors the use of linen cloth, though it was not until the later years of the republic that its use became general. The fabric was also employed as a writing material, as evidenced by the Roman *libri lintei*, or "linen books." In medieval times linen clothing was quite generally worn throughout continental Europe, while the art of linen weaving was practiced in Great Britain as early as the Anglo-Saxon period, the fifth or sixth century of the Christian Era.

Manufacture. At the present time the production of linen takes high rank among the textile industries, both in point of extent and in output. The modern manufacture of the fabric dates from 1787, when two English inventors, John Kendrew and Thomas Porthouse, secured a patent for a "mill or machine upon new principles for spinning yarn from hemp, tow, flax or wool." From this invention was developed the perfect system of machinery which equips the modern spinning mill.

The preliminary process of preparing the flax for the mill is as interesting as it is important. The seed capsules must be removed, and the separate fibers must be combed out, untangled and placed in smooth, parallel rows. When freed from all impurities the flax is of snowy whiteness, lustrous and silky. The flax threads are spun into yarn, which in turn is handed over to the weaver to make into cloth, processes which are described in the articles SPINNING and WEAVING.

The introduction of modern machinery was the death blow to the fireside manufacture of linen, and the old-fashioned spinning wheel, once a familiar furnishing of peasant cottages and the colonial homes of the early American settlers, is to-day but an interesting relic. But how much it has been a part of the life of the people for centuries past may be judged from the prominent place it has in painting, song and story. From the Greek Fates (see FATES) spinning the thread of human destiny down to George Eliot's hermit weaver, Silas Marner, literature is rich in allusions to this symbol of human skill and thrift.

Fabrics. Linen fabrics show in a wide diversity, both in kind and in quality, ranging from the heavy sail cloth that equips the masts of a sailing vessel to the lustrous damask that beautifies the luncheon table. The heaviest manufactures include sail cloths, canvas, tarpaulin, sacking and carpeting, made principally in the Scottish towns of Dundee, Arbroath, Forfar, Kirkcaldy and Aberdeen, and in Barnsley, England. Medium weight linens find very general use, serving as tent covers, toweling, men's outer garments, linings, upholstery work, etc., and appearing for the trade as duck, huckaback, crash, tick, dowlas, low sheetings and low brown linens. Plain bleached linens are used chiefly for shirts, collars and bed sheets. Under the head of twilled linens are included dimity for household use and damask for table linen. Cambrics, lawns and handkerchiefs are included in the fine linens.

The linen industry in England is centered at Barnsley and Leeds, one of the factories in the latter town having one room which covers two acres. The finest linen manufactures of Great Britain are chiefly in Belfast and other towns in the north of Ireland. France, Belgium and Holland are renowned everywhere for their superior linens, and France is without a rival in the manufacture of lawn and cambric. In the United States the production of linen fabrics until 1914 was practically confined to the making of thread, twine and toweling, but the manufacture of finer linens received a great impetus when the War of the Nations broke over Europe and closed the markets.

Special Characteristics. Because of the delicate structure, durability and length of the flax fiber, linen fabrics are in several respects superior to cotton. Linen cloth is smoother and more lustrous, it soils less easily, and, being less spongy than cotton cloth, it does not absorb and retain moisture so readily. Indeed, white linen is generally associated with cleanliness and purity, an idea occurring frequently in Scripture. A typical instance is found in *Revelation* XV, 6, which speaks of the "seven angels clothed in pure and white linen." No other fabric leaves the hands of the laundress with quite the same spotlessness, gloss and smoothness, and the thread spun from the flax, firm and strong in spite of its delicacy, is used to make the rarest and finest lace.

It should be noted that many fabrics now on the market as linen are not pure linen; manu-

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facturing ingenuity has made it possible to mix cheaper material with flax and produce a product which only the expert can detect as inferior. Hemp is the usual substitute. S.L.A.

Consult Gibbs's *Household Textiles;* Moore's *Linen.*

Related Subjects. The reader is referred to the following articles in these volumes:

Adulteration in Foodstuffs and Clothing	Dimity
Cambric	Flax
Damask	Hemp
	Lace

LING, PEHR HENRIK (1776-1839), a Swedish poet, remembered not so much for his relation to literature as because he invented the so-called Swedish system of gymnastics. He traveled in his youth through France and Germany, and taught fencing, first at the University of Lund and later at a military school in Karlberg. Like Jahn in Germany, he tried to stir up love of country in the young men by his writings, and at the same time he trained their bodies at his gymnastic institute in Stockholm. His system of exercise for the development of the different parts of the body has been very widely adopted, and has formed the basis for many subsequent gymnastic methods.

LINNAEA, *li ne'a,* or **TWINFLOWER,** a delicately-beautiful little wild flower, found in cool, mossy northern woods. Its creeping stems trail through woods and on mountains of North America from Labrador as far south as Maryland, and in the northern countries of Europe and Asia. Here and there slender stalks rise from the creeping stems, each bearing several pairs of round, evergreen leaves and two beautiful, drooping, bell-shaped flowers of pink or rose-tinged white. These small, shy, perfume-laden twinflowers were favorites of the eminent Swedish naturalist, Linnaeus, and were named for him. As Emerson expresses it, they are a "monument of the man of flowers."

LINNE, *lin'nay,* KARL VON, better known as LINNAEUS, *li ne'us,* (1707-1778), one of the world's greatest naturalists, was born at Rashult, Sweden. Because he was the first naturalist to arrange the plants of earth according to a scientific classification, he is sometimes called the "father of modern botany." He began to write his great books on plant life in 1729; the first was a small one on the sex of plants. The following year he began his lectures and revels in the wonders of plants and flowers. He then wrote his celebrated *Systema Naturae.* He went to Amsterdam, Holland, to live with the famous Professor Boerhaave, and published his *Fundamenta Botanica* while there. A wealthy banker invited him to visit him in his magnificent garden at Hartecamp, where for a period he worked and lived like a prince, and wrote his *Flora Lapponica,* the result of a trip through Lapland.

In 1740 Rudbeck died, and Linnaeus succeeded him as professor of natural history at the University of Upsala. In 1750 he published the *Philosophia Botanica* and three years later *Species Plantarum.* His published works number over 180. To him science is indebted for the introduction of a new system of naming plants, known as the *binomial* (two-name) *method.* He placed the specific name of the plant in the margin, while the name of the genus stood at the head of the description. Though this arrangement is not followed today, it laid the foundations for present systems of classification. He also originated the method of classifying plants according to the number of stamens and pistils. The lowly, fragrant linnaea was named after Linnaeus.

LINNET, *lin'et,* a small finch, so named because it feeds on linseed, or flax, and hemp. In summer the male is a chestnut brown in color, with forehead, throat and breast of crimson. The plumage varies greatly in color with the season, causing the same bird to be known at different times by different names, as *gray linnet, red linnet,* etc. It has a sweet song and is easily tamed, making it a favorite cage-bird. The North American linnet is called the *redpoll.* It nests in the extreme north and in winter migrates as far south as Virginia and Illinois. One species is very common in California. The linnet builds its nest of dry grass and moss in low trees, bushes or tufts of grass; the eggs are four to six in number, and are white, tinged with green or blue and spotted with reddish brown.

LINOLEUM, *li no'le um,* a preparation of linseed oil which is hardened by falling in the form of a spray through a current of air. By this means it becomes an elastic and tough mass. Chloride of sulphur was first used as a hardening agent, but it was discovered that the combination with oxygen secured the same effect. It is used as a substitute for India rubber when rolled into sheets, and when vulcanized, or hardened by heat, it may be polished like wood for handles of knives or for moldings. When dissolved it is used as a varnish for waterproof fabrics; as a paint it may be used on both iron and wood, and as a cement it is as adhesive as glue.

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A floor covering is made with linoleum as a base; it is more durable than oil cloth, which was once largely used. It is made by mixing the linoleum cement with ground cork, rosin and kauri gum, and, if a plain linoleum is desired, mineral coloring is added. This mixture is spread on burlap and passed through rollers to give it a smooth surface and uniform thickness. The inlaid, or figured, linoleum is made by stamping the pattern upon the surface, or making the design with cements of different colors.

LINOTYPE, *li'no tipe,* or *lin'o tipe,* a machine for setting type, so named because it casts a solid bar of raised letters the length of a desired line. Although complicated in design, the machine is simple in use and enables one printer to do the work of about eight in setting type by hand.

The operator sits before a keyboard similar to that of a typewriter, although much larger. He presses the key corresponding to that of the desired letter, and a brass mold, or *matrix,* having the letter impressed on its edge is released and travels down an inclined tube to a moving belt by which it is carried to its proper place in the line. The spaces between the words are formed by duplex wedges dropped into place in the same manner by pressing a key.

When the operator has set all the characters the line will hold, it is transferred automatically to the casting apparatus. Here the line is properly spaced, or "justified." The molds are then filled with melted type metal and a solid line of type is cast, which is carried, also automatically, to its proper position in the stick. The matrices are then returned by a lever to the case, being guided to their proper places by elevations and depressions on the back. The operator is thus relieved of the task of placing the type in the stick and distributing the matrices, and is able to attain great speed. The average speed is about 3,500 "ems" an hour, but a rapid operator may set 5,000 ems, and over; about 2,700 ems are contained in one page of this book.

The linotype machine was invented by Mr. Ottmar Mergenthaler, of Baltimore, who completed it in 1884, after twenty years of experimentation. Its success has been enormous, and no other type-setting machine is so widely used in the newspaper offices and other printing establishments of the world. It has now been developed to such a point of excellence that it is capable of the most intricate work. The cost of a machine, with attachments for electric power, is about $3,000.

LIN'SEED OIL, which is pressed from the seed of the flax plant, is the only oil successfully used in mixing paints. It is adapted to this use because it has the property of absorbing oxygen from the air and of drying quickly when spread in thin coats. The tough skin formed does not break or chip, and it withstands the weather. No substitute has ever been found, and no adulterant has proved successful. It is prepared in two ways—by hot press and by cold press. The latter gives a better grade of oil, but not in so great quantity. In the hot-press method, the seed is ground, boiled in water and pressed. The oil derived by the hot-press method is dark and has an unpleasant odor, but that defect has been remedied by chemical processes. It is also much cheaper. Linseed oil was known in very ancient times, but its peculiar properties as a drying oil were not made use of until the twelfth century. The production of linseed oil is from eighteen to twenty-seven per cent of the weight of the seed, depending upon the quality of the seed and the method of extracting the oil. The average yield is about sixty-six gallons to the ton. Under normal conditions linseed oil costs from sixty-five to seventy cents a gallon. See FLAX; PAINT; VARNISH.

LIN'TON, WILLIAM JAMES (1812-1897), an English wood-engraver and writer whose book illustrations won for him an enviable reputation in his own day—a reputation which critics of later times have confirmed. He was also known as a radical republican, and published various periodicals in the interest of political reform. The last thirty years of his life he spent in the United States.

LINZ, *lintz,* a city of Austria, capital of the duchy and crownland of Upper Austria. It is an old city; its name appears in manuscripts as early as 800, and it is believed to have existed in Roman times. Some of its old buildings are interesting and picturesque, but for the most part Linz is a modern city, with attractive suburbs, flourishing manufactures and a thriving commerce. Much of its trade is with Vienna, between which city and Linz boats ply daily. For Linz is on the Danube, and from its wharves are sent out not only its own manufactured articles, such as machinery, tobacco, woolen goods and leather, but products of the tributary region, which are brought in by the railroads which make Linz their center. Its population in 1910 was 67,817.

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LION, *li'un*, one of the strongest and most ferocious of wild creatures, known as the "king of beasts" and the "lord of the jungle." With respect to its appearance the lion well deserves these titles, for the powerful frame, large head and abundant growth of mane on the male give it a truly regal bearing, while its ferocity and appalling roar have made it the terror of the numerous animals on which it preys. It is the most famous member of the cat family—the cousin of the amiable "tabby" of the fireside and of the savage tiger, puma, lynx and leopard. Of this group the lion and the tiger are the largest members and of these two the tiger is the fiercer.

Those of the "jungle lords" which attain the greatest size are three feet high, nine and a half feet long, measuring from nose to tip of tail, and weigh almost 500 pounds; the majority are perhaps two-thirds as large. The tail, which is one-half as long as the body, ends in a hairy tuft, which, with the mane, is the distinguishing physical characteristic of this member of the cat family. Only the male has a mane, the growth of which begins when the animal is three years old. A lion is full-grown at six or seven years, and lives from thirty to forty years. Pale tawny is the characteristic color of the coat, though some specimens are reddish, and occasionally a lion is black. The mane is usually darker than the coat and may have blackish patches. Besides being a mark of sex it serves as a protecting shield in the fierce combats for which the "king of beasts" is celebrated. Young kittens have black spots on their fur, but these disappear within a few months after birth.

Ages ago lions were found in great numbers in Europe, Asia and Africa, but they have been steadily driven back into the wild places by the advance of civilization, and now they are extinct in Europe, Asia Minor, Arabia and Egypt, and have almost disappeared from India. In Asia they are still found in the swampy lowlands along the Tigris and Euphrates rivers and in certain valleys east of the Persian Gulf; the African lion roams the southern parts of the Sahara Desert and the dense swamps of the tributaries of the Upper Nile, and is also found in the Kalihari Desert, in Abyssinia and in Mashonaland. The puma (which see) is sometimes called the American lion.

The Lion of the Wilds. The instinct of the lion to choose its lair in a secluded place is suggested in the following lines by the Scottish poet Thomas Pringle:

> Wouldst thou view the lion's den?
> Search afar from haunts of men;—
> Where the reed-encircled rill,
> Oozes from the rocky hill,
> By its verdure far descried
> 'Mid the desert brown and wide.

In dense thickets or patches of reeds, among rocks hidden by thickly-growing brushwood or in thorn-protected caverns, the lion lies sleeping through the day, and there are born in the spring season the baby lions. They are usually three in number and, unlike the kittens of the domestic cat, come into the world with their eyes open. Both parents are devoted to their offspring, and the male helps take care of his growing family until the young whelps are well grown.

It is chiefly at night that the lions hunt their prey. Antelopes, zebras and wild asses are much sought by them, but in those regions where wild game is being exterminated by the white man, they attack domestic cattle, goats, pigs, ponies and camels. Their powerful forelegs, nineteen inches around, and their great feet, armed with sharp, horny claws, constitute a terrible weapon whose striking power has been likened to that of a steam-hammer. Sometimes they kill their

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victim with a single blow, but if not, the huge paw may grasp the nose of the animal and jerk back its head so as to break the neck, or the cruel teeth may fasten themselves on the blood vessels in the throat. When several lions take part in a slaughter the leader usually consumes a "lion's share of the feast," while the others help themselves to what may remain.

The lion is generally supposed to be a fearless creature, possessing those qualities one expects to find in a king of the animal world. Yet true to its earlike instincts, it does not hesitate to wait in ambush for its prey and to [illegible] upon it unawares. Varying stories are [illegible] bravery and of its cowardice, of its [illegible] killed food, and of its [illegible] however, that, [illegible] with man and [illegible] and [illegible] should [illegible]

Morning the King of Beasts. [illegible]

matter to appreciate the difficulties attending such an undertaking, and it was only through the utmost attention to detail and unwearying patience that results were accomplished.

In Captivity. The lordly lion pacing restlessly up and down its cage is a source of unfailing interest to the visitor at the "zoo" or circus menagerie. "Has this noble creature visions of a home in a far-off desert or jungle?"

LIONS, MALE AND FEMALE

[illegible] As a matter [illegible] captivity it is [illegible] of those now in [illegible] the native haunts [illegible] cage [illegible] natural ferocity [illegible] superiority. They [illegible] the wooden floors of [illegible]

[illegible]

the meaning of this, he told them that it was the same beast he had once befriended. Slave and lion were then allowed to leave the arena and were afterwards exhibited in the streets of the city. One of Bernard Shaw's wittiest plays is a burlesque of this story.

In Biblical narrative there are numerous stories about lions or allusions to them. The best-known story is that of Daniel, the Hebrew captive at Babylon who was thrown into a den of lions because he persisted in praying three times a day to his God (see *Daniel* VI). In *I Peter* V, 8, Satan is likened to a roaring lion which goes about "seeking whom he may devour." The wicked, according to *Psalms* X, 9, lie in wait secretly "as a lion in his den."

From the days of the ancients the lion has had an important place in art and heraldry. It has appeared in sculpture and painting, and on medals and flags. To-day it is the emblem of Great Britain, and the lion rampant may be seen on the upper righthand quarter of the royal standard, the supreme flag of the British navy. Imposing sculptured lions guard the celebrated Nelson column in Trafalgar Square, London.

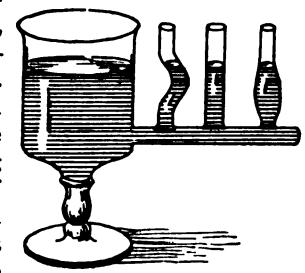
The lordly bearing of the lion is reflected in many familiar expressions. Richard I of England was called the "Lion-hearted" because of his heroic nature, and we speak of *lionizing* a man when we bestow popular honors upon him. The old story from *Aesop's Fables,* about the lion that hunted with the fox and wolf and claimed three-thirds of the game, has given rise to the expression "the lion's share." V.L.K.

For illustration of various members of the cat family, see article CAT, page 1220. Consult Herbert's *The Life Story of a Lion;* Carter's *Lion and Tiger Stories;* Patterson's *The Man-Eaters of Tsavo.*

LIPPI, *le'pe,* FILIPPO (1412-1469), commonly known as LIPPO LIPPI, an artist-monk, considered the first representative of the Florentine school of painters. His Madonna paintings are among the treasures of many famous collections. Fra Lippi loved gayety so much more than work that it was necessary for his patrons to lock him in a room while he was painting. But locks and keys did not avail, for 'tis said he tore his bed sheets to strips and let himself down from the window by them. However this might be, his works are noted for their warm, transparent color and expression of human sympathy. His greatest works extant are the frescoes in the Cathedral of Prado, representing scenes from the lives of John the Baptist and Saint Stephen. At the time of his death he was at work on a series of incidents from the life of the Virgin in the cathedral apse at Spoleto.

His son, FILIPPINO LIPPI (1460-1504), inherited his father's skill, and his art shows the influence of his father and that of Botticelli. Among his famous frescoes are scenes from the lives of Saint Peter and Saint Paul, in the Brancacci chapel at Florence. His finest easel-paintings are *The Virgin and Saints* in the Uffizi at Florence; *The Adoration of the Magi,* and *The Vision of Saint Francis.*

LIQUID, *lik'wid,* that state of matter in which its particles are not fixed with regard to other particles, but are free to slip or flow over each other under very slight impulse; at the same time a liquid substance, unlike a gas, possesses definite volume, almost incompressible. Unlike a solid, a liquid will fill every crevice of the containing vessel, and if there are several arms of different shapes, it will rise to the same level in all of them (see illustration). The free surface of a liquid has a tension due to molecular action, which acts like a thin skin. A needle will rest upon it without sinking, and it will support oil. It is surface tension, also, that makes water form into spherical drops in the air.



The figure shows that a liquid has no shape of its own but assumes the shape of any vessel into which it is placed.

LIQUID AIR is air reduced to a liquid state by compressing it at a temperature of 220° below zero F. under a pressure of 585 pounds to the square inch. It is of little use except to scientists, though for a time believed one of the most valuable discoveries of modern times. Its main importance to commerce is in the manufacture of large quantities of nitrogen (for ammonia, etc.) and oxygen. But it does so many wonderful things in the laboratory that it may yet become useful elsewhere. It is so cold that when placed on ice it will boil. If enclosed and heated it becomes a powerful explosive. Charcoal cooled by it absorbs gases very readily and can produce an exceedingly high vacuum. It increases the power of magnets, but lessens the action of chemicals, re-

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duces the photographic power of Röentgen rays to seventeen per cent of the normal, and lowers the resistance of metals to electricity. Copper, ordinarily a poorer conductor of electricity than silver, it makes a better conductor. Liquid air itself is a non-conductor.

Liquid air was first made by Wroblewski of Cracow, in Austrian Poland, in 1883. Previous to that date no one had succeeded in producing a sufficiently low temperature to accomplish the feat.

LIQUID FIRE, introduced into the War of the Nations by the Germans, is a modern successor to Greek fire (which is described in these volumes under its own title). The liquid in its composition was frequently a mixture of gasoline and pitch or other coal-tar oil. It was shot from an apparatus known as a *Flammenwerfer,* or flame-thrower, for which a number of patents had been granted several years before the war. In the Flammenwerfer were two barrels. From the large lower one the main stream of the combustible liquid was propelled. From the upper barrel came a smaller stream which was automatically ignited as it reached the air, forming a jet of fire which fell upon the principal flow, set fire to it at the point where flames were desired, and was then shut off. The force of the discharge prevented the fire from creeping back to the flame-thrower, and by slowly changing his aim, the operator could move the flames where he wished. In addition to the intense heat, the burning of the tar products caused a thick gray smoke and an unbearable smell.

LIQUORS, *lik'erz.* See DISTILLED LIQUORS.

LIRA, *le'rah,* the coin which is the basis of the monetary standard in Italy, having the same position as the dollar in the United States and Canada. A millionaire in Italy is one who has a million *lire.* The lira is a silver piece which circulates in the Latin Monetary Union (France, Italy, Switzerland, Belgium and Greece) at par with the French, Swiss and Belgian franc and the Greek drachma. It contains one hundred *centesimi* and is worth about $0.193 in American and Canadian money. Sometimes the same name is given to the Turkish coin of one hundred *piastres,* worth about $4.40. *Lira* is a corruption of the Latin word *libra,* meaning a *pound.*

THE LIRA
Obverse and reverse sides.

LISBON, *liz'bon,* the immediate successor of Venice in the early modern period as the maritime queen of the Western world, is the capital of Portugal. It is majestically situated on a low range of hills overlooking the Tagus River at a spot where that stream broadens to a width of nine miles, about seven miles from the ocean. In the background rises the lofty granite range of Cintra, and interspersed everywhere are semi-tropical gardens. Lisbon ranks next to Naples and Constantinople in regard to beauty of situation. Its harbor is one of the finest in the world—deep, well-sheltered and large enough to hold all the navies of Europe. The seeker after the picturesque must frequent the water front and the old section of the city which escaped the terrible earthquake of 1755; for the new quarter, constructed since that date, is decidedly modern, with wide, regular streets lined with fine homes and shops and adorned with many beautiful squares. The old quarter lies under the shadow of Moorish castle walls, and presents many curious sights along the steep narrow thoroughfares. Here no wagons pass, for the poor carry their burdens on their heads, and the more prosperous load down their donkeys. The cries of peddlers rend the air, and the vegetable venders still carry their stock in trade in baskets suspended from long sticks across their shoulders. Many Lisbon types are also found along the water front.

The finest structure in Lisbon is the monastery and church of Belem, a monument to the great seamen of Portugal, begun in 1500. The monastery is now used as an orphanage. The church of Estrella, with its dome of white marble, is a reduced copy of Saint Peter's at Rome. The former royal palaces are not of particular beauty. The government offices, the custom-house and the marine arsenal surround one of the city's finest squares, facing the bay. Here also are to be found a military arsenal, military and naval schools, libraries, academies of art and public schools of high standard. However, the arts and sciences are not in a flourishing condition. The manufacture of gold and silver wares, cotton spinning and weaving embrace Lisbon's leading industry; its exports, valued at over $20,000,000 annually, embrace wine, cork, fish, cattle, oil, salt and fruits.

Previous to 1147 Lisbon was taken three times by the Christians from the Moors. It has suffered severely from several earthquakes, and has been the victim of plagues. But the greatest disaster experienced was the earthquake of 1755, when in less than ten minutes

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most of the city was reduced to a heap of ruins. About 40,000 of its inhabitants were killed, and the loss of property aggregated nearly $100,000,000. The nineteenth century was marked by many military revolts. Since the deposition of King Manuel in 1911 and the declaration of Portugal as a republic, the spirit of unrest, general throughout the republic, has left its impress upon Lisbon. Population in 1911, about 385,000.

LIS'GAR, Sir John Young, Baron (1807-1876), a British diplomat and statesman, Governor-General of Canada from 1869 to 1872. Lisgar, or "Sir John," as he was commonly known, was born at Bombay, India, and was educated at Eton and Oxford. He then began the study of law, but while still a student was elected to the House of Commons, in which he represented the same constituency for nearly twenty years. In 1852 he was given a place in the Conservative Ministry as Chief Secretary for Ireland, and three years later was sent to the Ionian Islands as Lord High Commissioner. In 1860 he became governor of New South Wales.

In 1868 the government offered him the Governor-Generalship of Canada, which had been declined by several other Conservatives because the Canadian Parliament was thought to have impaired its dignity by reducing the salary. Sir John, however, accepted the offer, and on January 2, 1869, was formally appointed Governor-General of Canada and governor of Prince Edward Island (the latter did not enter the Dominion until 1873). The Red River Rebellion was in progress when Sir John arrived in November, 1869, but it was suppressed in the next year. During his administration in Canada, Manitoba and British Columbia entered the Dominion, the Treaty of Washington was signed, and plans were perfected for the construction of the Canadian Pacific Railway. Sir John was a baronet by inheritance, and in 1870 was also created Baron Lisgar. At the close of his service in Canada he retired to his estates in Ireland, where he died.

LIS'TER, Sir Joseph (1827-), first Baron Lister, an English surgeon, distinguished for the introduction of antiseptics into surgery, was born at Upton, Essex. In 1854 he was graduated in medicine from the University of London; in the same year he became Fellow of the Royal College of Surgeons in England, and in 1855, of Edinburgh. He then became in succession professor of surgery at Glasgow, professor of clinical surgery at Edinburgh, and at King's College Hospital, London, and was appointed surgeon to the queen. The development of his theories regarding the efficacy of antiseptics in the treatment of wounds revolutionized modern surgery. His publications include many important books on the value of antiseptics. A modern antiseptic mouth wash, called *listerine,* was named for him.

LISZT, *list,* Franz (1811-1886), an Hungarian musician who ranks first among the great pianists of all time. The poetic quality of his playing, his ability and technique, combined with an intelligence, culture and enthusiasm for the high ideals of art, made him one of the most ideal personalities in this field of music. His influence in bringing before the public the work of Chopin, Berlioz, Wagner, Schumann and many others is incalculable. His pupils venerated him, and counted among them are many of the greatest masters of the pianoforte of the nineteenth and twentieth centuries. His transcriptions for the piano are considered the finest ever made. His Hungarian rhapsodies stand alone, and the list of his original compositions is long. His chief works are the *Faust* and *Dante* symphonies and the oratorios *Saint Elizabeth* and *Christus.*

FRANZ LISZT

Liszt was born in Hungary. He made his first public appearance in his ninth year. Later he studied in Vienna and Paris; in 1849 became director of the Court Theater of Weimar, and because of his wonderful concerts this little town became the center of the musical life in Germany. In 1861 he resigned his appointment, and his subsequent years were divided between Weimar, Rome and Budapest.

LITANY, *lit'a ni,* a form of prayer or supplication in which the people take responsive parts; it may therefore be called a dialogue of prayer. The word is derived from Latin and Greek words meaning *to pray.* Originally a litany was recited on special occasions and in processions, but now it is used at any time, and the individual may say both the prayers and the responses. This form of prayer is a supplication for grace or for deliverance from danger, pestilence or sin. The Roman Catholic, the Episcopal, the Lutheran and some other

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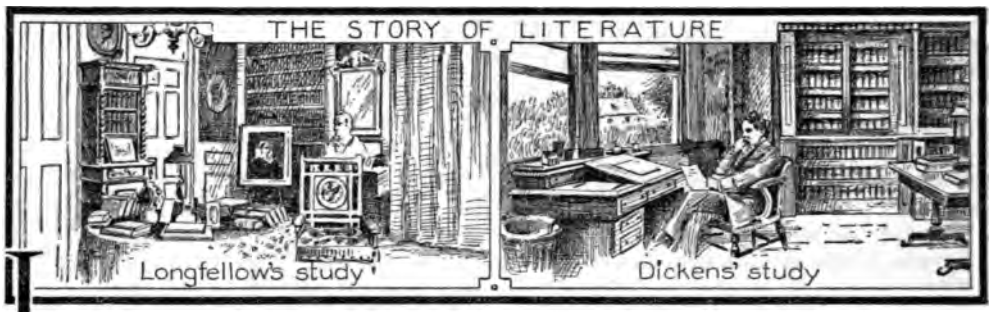
Protestant churches use the litany. The three litanies most commonly said in the Roman Catholic Church are the "Litany of Saints," the "Litany of the Holy Name of Jesus" and the "Litany of The Blessed Virgin." The first-named is used more frequently in consecrations and other solemn services. G.W.M.

LITER, *le'ter,* a measure of capacity in the metric system of weights and measures. It contains 61.026 cubic inches, and is equivalent to 1.0567 liquid quarts. A vessel three inches square and 6.8 inches high will contain approximately a liter of water. The liter is equal in volume to a kilogram of water at its maximum density, 32°. See METRIC SYSTEM.

COMPARATIVE MEASURES

The liter is the official measure of capacity of liquids in all of Western continental Europe and in Spanish-America, including all the South American republics.



LITERATURE. This word, which is from the Latin, and means *letter,* is well known to every child, but like many other common terms, it is rather difficult to define. The simplest definition makes it include everything written or printed, on whatever subject; but that is making the true meaning far too broad. Perhaps it can best be described as "the best utterances of the human mind, as handed down in writing." In this form it would include nothing that is merely temporary in its appeal, as a "topical" song or jingle; nothing that is harmful, as the *Deadwood Dick* tales which the small boy hides when he hears his mother's footsteps; nothing technical, as the very latest treatise on mathematical astronomy. But beyond these, all that learning, imagination and inspiration have given to the world, all that writing has preserved and time has tested, is *literature.*

There are many kinds of literary productions, each with its own special appeal; there are poems, novels, short stories, essays, dramas, histories, letters, biographies, orations; but in order to make good its claim to be considered literature, each of these has to prove that it has in it something which can inspire and ennoble human character. The *form* counts for a great deal—a choice of words which are musical or forceful or particularly expressive; but the *spirit* is more.

Two Great Divisions. The most natural division of all literary works is into the two great groups of *prose* and *poetry.* If anyone who has not given the subject careful study were asked which is the simpler and which would naturally come first in the development of a literature, he could undoubtedly say prose. Molière in one of his charming comedies shows the amazement of a man of middle age when he suddenly awakens to the fact that all his life he has been talking prose. Most people can feel no such fresh, joyous surprise over so commonplace a matter—they have always known that they talked prose, the simpler form of literature, as it seems to them.

But a little study shows that prose literature does not naturally come first. Almost every old nation had its poetry long before it ever developed a prose style, and the reasons for this are plain. First of all, poetry stands for the emotion as prose stands for the reason; and the more primitive, the closer to nature men are, the more completely does their emotional life control their intellectual forces. They feel before they reason, and their feeling, whether it be religious or warlike, tends to express itself in poetry. Then, too, just because prose is such a commonplace, everyday affair, the idea of preserving it is slow in awakening. A patriot by his impassioned utterances stirs a people to successful protest against tyranny; they

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feel the force of his words, but after all he is only talking to them, and what he has said another can say if occasion arises. But a poet, a man with the musical feeling, the love of rhythmic words well developed, makes a song about that same patriot, and the people chant it over and over, and hand it down as a valuable heritage to their children.

That brings up another point. There is a long period in the early literary history of every people when its productions are not written, but are passed from one generation to the next by word of mouth, and there poetry has the advantage because its rhythm makes it far easier to remember. For all these reasons, and some others, poetry practically always comes before prose.

The Earliest Forms. Another interesting fact in connection with the beginnings of literature is that almost every people, if it works out its own literary history, unaffected by other peoples further advanced, begins with practically the same kinds of poetry. There are religious utterances, either hymns to some deity or pleadings from religious leaders to their followers, and there are war songs. These two types seem to express the most primitive emotions of practically every people. Sometimes the two are combined, as in Homer's great poems, which tell of the gigantic struggles of the early Greek heroes and also of the marvelous doings of the gods.

How Literatures Are Indebted to Each Other. This mention of Homer brings the discussion to the point from which any account of European and American literature must start —to the literature of ancient Greece. This article makes no attempt to treat historically the literatures of the various countries; they are treated under separate headings. The various types, too, as poetry, drama, fiction, have articles of their own in these volumes, but the dependence of the various literatures upon one another is an interesting point which may well be emphasized.

At first the statement that literature really completed its evolution in ancient Greece and that no totally new form has been invented since may seem startling and perhaps untrue; but thought and study show its justice. Never has the epic been brought to greater perfection than in those works credited to Homer; never were more exquisite lyrics written than those of Sappho, or more wonderful tragedies than those of the "great three," Aeschylus, Sophocles and Euripides. History, oratory, philosophy, criticism, all these the Greeks brought to a high point of perfection, and their myths and legends are as delightful as any modern tales. There have been special developments of certain branches of literature, it is true, but the Greeks began them all, inventing them themselves, apparently owing no debt to any older nation.

And from this foundation of Greek literature have flowed all the streams of modern European literature. The Romans were frank imitators, developing only a few forms in greater perfection than their predecessors. With the spread of Christianity there was a change. Christian writers abhorred the pagan literature of Greece and turned to the sacred books of the Hebrews for their inspiration; but when, after the passing of the Dark Ages, with their minor efforts, there came that marvelous awakening known as the Renaissance (which see), Greek literature came into its own again.

In the new, modern Europe the foremost nation from a literary point of view was France. Romances of chivalry, allegories and religious dramas were prevalent during this French period, which lasted from the twelfth to the late fourteenth century. Then Italy had its day, and every literature of Europe felt the Italian influence. Later, a greater individuality became evident, each nation developing forms which best suited its own peculiarities and genius, but from time to time there is clearly visible in the writings of English authors the influence of various continental countries. England itself, largely because of its island position, never gained any general intellectual supremacy, though certain of its authors were widely read on the Continent; but just for that very reason, because England drew from other literatures more than it gave out to them, the student of English literature cannot really understand what he studies without some knowledge of the literatures of other European countries.

When one begins the study of the literatures of Canada and the United States, it is obvious that they cannot be considered except in connection with that of England. Each country has made its own special types, in accordance with its varying conditions of life, but the influence of the parent English stream is visible throughout; and it is not lack of patriotism but a wise desire to follow the stream from its source which decrees that a study of the literature of England shall be preliminary to that of either of its American descendants.

The Study of Literature. Some schools lay most stress on science, some on mathematics,

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some on languages, ancient or modern; but no school attempts to plan a course of study which omits literature, for no one questions for a moment its supreme importance. To present reasons why it should be studied seems like gilding refined gold or perfuming the violet—the very definition describes it as "the *best* utterance of the human mind," and it surely needs no argument to convince anyone that he should, so far as possible, acquaint himself with this best. In the first place, the study of literature gives more genuine pleasure than almost any other study, and is so adaptable that it fits the requirements of every student, be he child or man. One person has no liking for fiction. Why spend time reading about a lot of people who never lived and a lot of things that never happened? he demands. For him, then, there is history no less exciting than a novel, but with the saving grace of truth. There is Prescott's *Conquest of Mexico,* parts of which no boy can read without a thrill; there are Parkman's tales of the fascinating pioneer days in the western regions of North America; there is Motley's *Rise of the Dutch Republic;* and there are scores and hundreds of other books which will acquaint the fact-hungry reader with the story of the world's life.

Another reader finds history "dry," but delights in poetry, which is literature at its highest and best; another finds pleasure in essays grave or gay, in which thoughtful men have given their views on subjects of wide interest; still another finds most attractive the study of types of human character as set forth in great novels. But wide as are the variations in human tastes, the variations in literature are even wider, and no honest seeker for literary pleasure need go away unsatisfied; moreover, there is a constant volume coming from the presses.

Another thing which literature gives is information. A person cannot travel everywhere, meet people of all types, converse with men of all minds; but by means of the printed page he may do all that, even journeying back into the past and making the acquaintance of great men who have lived in all times. "What would we not give," someone sighs occasionally, "if there had been cameras in the days of Caesar that we might know just how he looked; if there had but been phonographs in the time of Lincoln, that we might hear his very words!" But Caesar's writings give a more accurate estimate of the man than could any camera, and Lincoln still speaks in the sayings which literature has preserved for us.

But by no means the least of the reasons for studying literature concerns its inspirational power. It is impossible to estimate in any way the good that literature has done in this way. This does not mean that it actually urges to effort; "didactic" literature, or that which strives to teach, is by no means the highest type. But literature presents, both in history and in fiction, types of men who have achieved; it shows the motives which have guided the world's great men, the forces of which they have made use in overcoming their obstacles. And this is not all. Merely by filling the mind with lofty thoughts, even if it touches not at all on the so-called "practical" side of life, it makes for better character, for higher ideals. Such lines, for instance, as these of Phoebe Cary's—

> If a task is once begun,
> Never leave it till it's done;
> Be the labor great or small,
> Do it well or not at all,

have a very obvious lesson to teach, and it may be that just that compact, rhymed way of putting the matter may be helpful to some readers; but there is no less inspiration in sheer beauty, in such lines, for instance, as these of Henley's—

> A late lark twitters from the quiet skies,
> And from the west,
> Where the sun, his day's work ended, lingers as in content,
> There falls on the old gray city an influence luminous and serene,
> A shining peace.

How Literature May Be Studied. This is a broad topic, too broad for complete discussion here; but a number of general suggestions may be offered. Studying a piece of literature is a different thing from merely reading it, aiming as it does at getting from it all that it contains; but one precaution should be observed. Any writing, whether poetry or prose, should never be studied so long and so closely that the student is bored and loses all feeling of pleasure. Such a danger is greater with poetry than with prose. Perhaps the child in fifth or sixth grade has a favorite poem—it may be Bryant's jolly little *Robert of Lincoln.* When he finds that the class is to make a study of the poem he is delighted—it gives him a pleasant sense of ease and familiarity. This persists for a time, but as he is compelled to study the poem for rhyme and for rhythm, to trace every unusual word to its source, to look up the habits of the bird that he may know whether the poet has described them correctly, to find the meaning of

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every allusion, he begins to hate the sound of the merry jingle, and to wish that he need "never hear that old poem again." This is most unfortunate, as it is far more important to foster the child's love for poetry than to instruct him in the intricacies of rhyme and rhythm.

But it is always possible to stop just short of the point where pleasure ceases, and still to gather a goodly store of information. In studying poetry, the pupils will enjoy picking out the words which they never use in their everyday conversation and trying their own substitutes in the poem; they will enjoy comparing different poems to see whether the "music" is the same; and sometimes they may profitably rewrite portions in their own words. This paraphrasing, however, once very popular, is much less used at present, for in the case of real poetry, with beauty and music, it is far better to let the pupils keep the idea in the original words. If exercise in paraphrasing is desired, it should be employed on poems which have not been studied for their literary beauty.

When stories are the subject of study, the different phases of plot, character, description and emotion may be touched upon even with young pupils. This entire subject is treated fully under the heading of FICTION. Then, too, there is the department of the history of literature, in certain departments of which children can be brought to take a real interest. They are certain to enjoy any selection more if they know something about the author who wrote it, and perhaps about the circumstances under which it was written. What child would not feel an increased delight in the stories of Hans Christian Andersen if he were told of the strange childhood of that master of fairylore, or of the extraordinary things he used to do in the days of his fame? What child could resist the appeal of Dickens' sad boyhood, or of Longfellow's sincere love for children? It is just here that these volumes will supplement any study of literature, for they contain articles on all the world's distinguished writers, and especial care has been taken to include in these such facts as will interest children. C.W.K.

Literature for Children

Directing Children's Reading. The wealth of literature is on every hand, and all are prone to regret the lack of time for exploring its treasures. We must acknowledge, however, that often the little time afforded for reading is wasted over trivial and transient material. This is due to a lack in early training.

Children may easily be directed towards literature which will entertain, instruct and develop a love for that which is good in content and excellent in form. The history of individual children so trained by careful and competent parents and teachers shows to all the natural way to reveal to the young the joys of the world of books—joys conserved for our delight by master-minds through the ages.

Perhaps a five-foot shelf will hold all that is best in pure literature, but the choice of titles must be made from thousands of volumes, many of them of little value. To assist in making that choice should be the duty as well as the pleasure of the child's elders who must realize that a taste for that which is good in literature must be fostered in youth or the man will seldom possess it. The mother may sing the songs and recite the lyrics that will appeal to the child's musical ear and give him a feeling for rhyme and rhythm. In kindergarten and throughout the elementary grades this exercise should be continued—the reading aloud by the teacher or mother of the most musical literature that appeals to the ear and awakens spiritual joy, which little people may possibly obtain in no other way. The children, too, as fits their ability, should be encouraged to read with appreciation of the beauty of expression the simplest poetry and prose of the greatest masters of style. Children should store the memory with literary gems; upon these they will frequently draw in after years to find comfort and inspiration.

In the selection of juvenile literature the individuality of the child will be considered, but a foundation of classic stories in prose and poetry that have lasted for many years and appealed to the children of many generations may well be given to all. The children of our time should have the jingles of *Mother Goose* for the tickling of their fancy and their sense of humor. The fairy stories of Perrault, of Grimm and Andersen belong to the kingdom of childhood by their imagination, humor and sense of justice.

The love of out-of-doors is inherent; all children are drawn to the little Indian boy Hiawatha and become veritable dwellers by the big-sea water, talking with the birds and playing with their brothers, the squirrel and

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the rabbit. The common things of life, the sun, the rain, the flowers, the stars, the rainbow, the song of birds—all are lifted into the realm of imagination and make a strong appeal to the hearts and minds of the children. Longfellow wrote this poem for his own peers, but the thought often persists when having the children dramatize many scenes from Hiawatha's adventures, how the poet who so loved little children would be moved almost to tears could he hear their limped tones repeat:

> From the red stone of the quarry
> With his hand he broke a fragment,
> Moulded it into a pipe-head,
> Shaped and fashioned it with figures;
> From the margin of the river
> Took a long reed for a pipe-stem,
> With its dark green leaves upon it;
> Filled the pipe with bark of willow,
> With the bark of the red willow;
> Breathed upon the neighboring forest,
> Made its great boughs chafe together,
> Till in flame they burst and kindled;
> And erect upon the mountains,
> Gitchie Manito, the mighty,
> Smoked the calumet, the Peace-Pipe,
> As a signal to the nations.

The world of art—pictures, sculpture and literature itself—is so based upon the stories of Greek and Latin literature that an early knowledge of their myths is almost invaluable. Based upon the phenomena of nature, to the children they appeal as stories of a by-gone day, giving delight to the imagination and peopling the fancy with bright, attractive beings. The sculptor has embodied his thought of Greek myth in numerous forms, and a knowledge of the source of the sculptor's inspiration, of what he is trying to shape in marble, enables us to understand, appreciate and enjoy his work. The painter also owes a great debt to Greek literature, and in every gallery we see the artist's conception of Aurora, or the fall of Troy, or of some hero or episode described by the Greek poets. Much is revealed to the visitor whose memory has been stored with the wealth of imagination that belonged to the early writers of our race—meanings, details, beauties that are not seen, or if seen, are not understood by others. Numerous books based upon the two great poems the *Iliad* and the *Odyssey* are in every public library ready for the teacher's use. She should have the poems themselves in her own collection, should know them and should make frequent reference to them.

In music the stories of the romances of the Middle Ages and the Scandinavian legends are largely drawn upon for themes and operas. They are fascinating stories in themselves and embody many characteristics of the brave people of the North. The heroes of Asgard, the struggle between the gods and the powers of evil destiny, the grandeur of scenery, the struggles of the elements, all the poetry of wind and wave and sky as revealed to those undaunted rovers of the sea, are all vividly portrayed in the myths of the North. We should remember this element in our historical development and see that the children have these stories as a background for all literature, art and music.

Milton's *Comus* is a play that should be given to the children that they may become interested in this gifted poet, though it is not generally considered as appealing to the young. This play is a dramatic presentation to the child's open mind of the beauty of goodness—shown in the childish characters—and the line, "Virtue alone is free," sings itself into his consciousness, awakening a responsive chord. *Robin Hood* and *The Idylls of the King* delight children at a time when adventure and romance and hero-worship have their day in the life of the young.

Meeting our greatest poet, Shakespeare, for the first time in that fairy play which is always a favorite, *A Midsummer Night's Dream*, the children happily continue to live with him in the story of *Julius Caesar*, in *The Tempest*, in *Macbeth* and in *Hamlet*.

As children reach the upper grades of school they should read such plays as *Julius Caesar*, *Henry VIII*, *Antony and Cleopatra*, and the like, in connection with their history lessons dealing with the same themes. The plays are not all historically accurate, but the divergence is not great enough to destroy their benefit. It will be well to note the discrepancies, as study proceeds.

It is difficult to interest children in ethereal questions directly, but the study of the contrasting characters of Macbeth and Banquo, of Cassius and Brutus, the discussion of motives underlying the actions of different types as revealed in the dramas, the close study of the great arguments where questions of morals are discussed with such skill, all form a possession that will always remain to strengthen and to inspire, to delight and to console.

The best literature is none too good for the children. The greatest writers use the simple, direct style characteristic of good writing; they fill the mind with images of beauty, and the emotions are appealed to through ennobling sentiments.

F.H.

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Graded Lists for Study

The following lists, divided by grades, suggest a wide range of literature for children, whether for reading or for study. The divisions between the grades are not unchangeable, for some children in the fifth grade are better able to appreciate good literature than are many eighth-grade pupils.

Grades One to Three

A Child's Garden of Verses.....Robert Louis Stevenson

Grimms' *Fairy Tales*—selected. Not all of these stories are suitable for children's reading. They were not written for children in the first place, but were studies in folklore, and while children of all countries have delighted in them, there are some among them which are coarse. Volumes of selections which are all that any teacher could desire are easily procured.

Aesop's Fables.

Lullaby Land.....Eugene Field

Tanglewood Tales and *Wonder Book*.....Nathaniel Hawthorne

Alice in Wonderland and *Through the Looking Glass*.....Lewis Carroll

Just-So Stories.....Rudyard Kipling

Poems.....Henry Wadsworth Longfellow

By no means all of these are suited for children of this age, but *Hiawatha*, as well as many of the shorter poems, will appeal to them. It is one of the books with which children should become familiar early, since it contains material fitted for all ages.

Wild Animals I Have Known.....Ernest Thompson Seton

Grades Four to Six

Norse Myths

These are retold in various forms for children. Hamilton Wright Mabie has a volume called *Norse Stories Retold from the Sagas*, and there is a delightful book called *In the Age of Giants* by Abbie Farwell Brown.

The Heroes.....Charles Kingsley

Grandfather's Chair.....Nathaniel Hawthorne

Robinson Crusoe.....Daniel Defoe

Swiss Family Robinson...Johann Rudolph Wyss

Jungle Books.....Rudyard Kipling

Adventures of Ulysses.....Charles Lamb

Franconia Stories.....Jacob Abbott

Story of a Bad Boy.....Thomas Bailey Aldrich

Animal Story Book.....Ernest Thompson Seton

Little Lord Fauntleroy.Frances Hodgson Burnett

Sarah Crewe.....Frances Hodgson Burnett

Little Lame Prince...Dinah Maria Mulock Craik

Nights with Uncle Remus..Joel Chandler Harris

Fairy Tales.....William Hauff

Bible Stories..Edited by Richard Green Moulton

Hans Brinker.....Mary Mapes Dodge

Water-Babies.....Charles Kingsley

Animal Story Book.....Andrew Lang

True Story Book.....Andrew Lang

Nonsense Books.....Edward Lear

Book of Verses for Children.....E. V. Lucas

At the Back of the North Wind.....George Macdonald

Rebecca of Sunnybrook Farm.....Kate Douglas Wiggin Riggs

Flamingo Feather.....Kirk Munroe

Old Indian Legends.....Zitkala-Sa

Seventh and Eighth Grades

Leatherstocking Tales...James Fenimore Cooper

The Spy.....James Fenimore Cooper

Ivanhoe.....Sir Walter Scott

Kenilworth.....Sir Walter Scott

Pilgrim's Progress.....John Bunyan

Little Women.....Louisa M. Alcott

Little Men.....Louisa M. Alcott

Eight Cousins.....Louisa M. Alcott

Arabian Nights.

John Halifax, Gentleman.....Dinah Maria Mulock Craik

Ballad Book.....Katherine Lee Bates

Merry Adventures of Robin Hood..Howard Pyle

Story of King Arthur and His Knights.....Howard Pyle

Child's History of England.....Charles Dickens

Oliver Twist.....Charles Dickens

Tales from Shakespeare...Charles & Mary Lamb

Puck and Pook's Hill.....Rudyard Kipling

The Nurnberg Stove.....Louisa de la Ramee

A Dog of Flanders.....Louisa de la Ramee

A Man Without a Country..Edward Everett Hale

Book of Saints and Friendly Beasts.....Abbie Farwell Brown

King of the Golden River.....John Ruskin

Rip Van Winkle and *The Legend of Sleepy Hollow*.....Washington Irving

True Bear Stories.....Joaquin Miller

Squirrels and Other Fur-Bearers.John Burroughs

Treasure Island.....Robert Louis Stevenson

In the Boyhood of Lincoln.Hezekiah Butterworth

Tales Out of School.....Frank R. Stockton

Lost in the Jungle.....Paul Du Chaillu

Hoosier Schoolboy.....Edward Eggleston

Lays of Ancient Rome.....Thomas B. Macaulay

Boys' and Girls' Plutarch.

Gulliver's Travels.....Jonathan Swift

This must of necessity be a special young folks' edition.

Consult Burt's *Prose That Every Child Should Know;* Field's *Finger Posts to Children's Reading;* Johnson's *Outline History of English and American Literature.*

Related Subjects. The following articles have to do with some phase of the general subject of literature. These volumes contain in addition hundreds of biographies of writers, which furnish in effect a history of the literatures of the most important countries, and the reader is referred for classified lists of these to the indexes at the close of such articles as HISTORY, NOVEL, POETRY, etc.

Allegory	Bible
Alliteration	Bibliography
Almanac	Bibliomania
American Literature	Biography
Anthology	Blank Verse
Augustan Age	Burlesque
Autograph	Canadian Literature
Ballad	Classics
Bard	Comedy
Belles-Lettres	Debate

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Dictionary
Didactic Poetry
Drama
Edda
Elegy
Encyclopedia
English Literature
Epic
Epigram
Essay
Fable
Farce
Fiction
Figure of Speech
French Literature
German Literature
Greek Literature
Hebrew Language and Literature
Idyll
Irish Literature
Legend
Letters
Lyric Poetry
Manuscripts
Masque
Melodrama
Metaphor
Meter
Metonymy
Minstrel
Miracle Play
Morality Play
Mystery Play
Novel
Ode
Oration
Palimpsest
Parable
Parody
Passion Play
Pastoral Poetry
Poet Laureate
Poetry
Prose
Proverb
Rhyme
Romance
Romanticism
Sagas
Satire
Skalds
Sonnet
Spenserian Stanza
Tragedy
Troubadour
Trouvere

SPECIFIC REFERENCES

Aeneid
Aesop's Fables
Aladdin
Ali Baba
Alice's Adventures in Wonderland
Anabasis
Ancient Mariner, The
Arabian Nights
Autocrat of the Breakfast Table
Barbara Frietchie
Barmecide's Feast
Becky Sharp
Ben-Hur
Beowulf
Biglow Papers
Bluebeard
Camille
Canterbury Tales
Casabianca
Charge of the Light Brigade
Cid, The
Cinderella
Courtship of Miles Standish
Don Juan
Evangeline
Figaro
Galahad, Sir
Godiva, Lady
Grimms' Fairy Tales
Hamlet
Hiawatha
Idylls of the King
Iliad
Junius Letters
Kenilworth
Lake School
Lancelot
Les Miserables
Lochinvar
Macbeth
Mahabharata
Mephistopheles
Merlin
Midsummer Night's Dream
Mother Goose
Nibelungenlied
Nicholas Nickleby
Odyssey
Paradise Lost
Pickwick Papers
Poor Richard's Almanac
Ramayana
Rip Van Winkle
Robinson Crusoe
Roland
Round Table, Knights of the
Scarlet Letter
Utopia
Vedas

LITHIUM, *lith'ium,* a soft, silver-white metal, and the lightest known solid. It is a little over one-half as heavy as water, and it floats on petroleum. When cut, lithium has a silvery luster, but it soon tarnishes when exposed to the air. It is softer than lead and harder than sodium. When thrown on water it decomposes the water and sets the hydrogen free. Lithium does not occur in a free state, but is found in solution in some mineral waters. It is usually obtained by separating it from its melted chloride by a strong electric current. It forms numerous compounds, some of which are valuable in medicine, while others are used to impart a red color to fireworks.

LITHOGRAPHY, *li thog'ra fi,* the art of drawing pictures, designs or writing on a stone or metal surface, in such a manner that the impression may be reproduced by printing. The plate is so treated that only the design traced by the pen or crayon will take up the ink, while the rest of the plate remains clean.

The Process. The stone used in lithography is a porous variety of calcium carbonate, found chiefly in Bavaria. The best stones are light gray in color. They are delivered in slabs from three to four inches in thickness and in sizes ranging from six by eight inches to forty-four by sixty-four inches. More recently zinc and aluminum have been substituted for stone. Excellent plates are now made of aluminum; they are convenient because they are flexible, uniform in quality and less easily broken.

When stone is employed, the treatment of the surface depends upon the instrument to be used. The surface is ground and left slightly roughened for the lithograph crayon; when a pen is to be used, the stone is polished with pumice stone. In one method, the design is drawn on the grained surface with crayon; it is an exact copy of the object, but turned upside down, like type in printing. The plate is then washed with a solution of gum arabic and acid. The acid decomposes the soap of the crayon and leaves the surface chemically prepared to take up fatty ink. The gum water covers the untouched portion of the stone with a film. Turpentine is then applied and an inked roller is run over the surface. The design readily absorbs the fatty ink, while the moist, gummed surface resists it. When a pen is used, the design is drawn with small dots on the polished surface. This is called pen-stippling.

Another process is by engraving. A smooth stone is first prepared with gum water. Its surface is then covered with lampblack or some other pigment, and the picture is scratched with a steel needle. When the design is completed, the stone is oiled, the oil being readily absorbed by those portions of the stone laid bare by the needle. The gummed surface here again

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resists the ink, which the oiled surface readily absorbs.

Printing was originally done on a hand press. The flexible aluminum plate, however, has made it possible to print on the rotary press, which prints two or more colors in succession. See PRINTING PRESS.

Color Process. This consists in reproducing the natural colors of the object. As many as thirty tones and an equal number of printings may be used, but for ordinary purposes the number is much less. Each color or tone is laid on a special plate and great care must be taken to see that the colors do not overlap and that they are exactly placed in the finished picture. A key or a series of registering marks on the margins of the plate guide the printer.

Photolithography. Photography is now used in conjunction with the lithographic process. In this process a photographic reproduction of the original on stone serves as a basis for the various color plates. A half-tone negative is placed on a stone previously coated with a solution of albumin and bichromate of potassium. The solution will be affected only by such light as can pass through the negative. Turpentine is then used to dissolve the unaffected parts and a positive is left on the stone. See PHOTOGRAPHY.

The progress of lithography since its invention in 1798 has been remarkable. The Germans, who discovered the process, early used it to reproduce the paintings of the great masters, but its high artistic possibilities were first revealed by French artists. However, other processes are largely superseding lithographic processes, because of the greater cost of the latter. The advent of the present-day half-tone illustrations, the so-called three-color and four-color painting from half-tone plates and what are known as the rotogravure and offset processes, are crowding lithography for supremacy. G.B.D.

Consult Rhodes' *Art of Lithography;* Brown's *Practical Text Book of Lithography.*

LITHOTOMY, *li thot' o mi,* from two Greek words, *lithos,* meaning *stone,* and *tamein,* meaning *to cut,* is a surgical operation for removing stones which form in the gall bladder, the bladder, the kidneys or the biliary ducts. Formerly the operation was very serious, but modern surgery has made it a safe minor operation, performed in a few minutes. The wound heals within a month.

LITHUANIA, *lith u a' ni a,* a region in the eastern part of Europe that is now included in the Russian governments (provinces) of Kovno, Vilna, Grodno, Vitebsk, Minsk, Mogilev and Suwalki. In 1569, Lithuania, then an independent realm, was merged with Poland into a single state. When Poland was dismembered, in 1792, 1793 and 1795 (see POLAND, subtitle *History*), Lithuania passed to Russia, and at that time it had an area of about 100,000 square miles. The country is forest-covered or marshy, and the productive areas of soil are limited. It is watered by the Dnieper, Pripet, Berezina, Dvina, Niemen and Bug rivers. The people are Lithuanians (including Letts), Russians, Poles and Jews. The Lithuanians, who probably number about 2,000,000, are a well-built people and represent a distinct physical type, having fair hair and skin, blue eyes and long thin nose and thin lips. They are woodmen, teamsters and tillers of the land. Their language is much like the Old Prussian, and their literature consists chiefly of folk-songs and religious tales. During the decade which closed in 1915 nearly 172,000 Lithuanian immigrants were registered at Ellis Island, New York. The territory of the Lithuanians is included in that section of Russia invaded by the Germans in 1915 (see WAR OF THE NATIONS), and held successfully by them until the close of the war.

LIT'MUS, a coloring matter made from lichens, used by chemists as an indicator because it turns red in the presence of acids and blue or deep violet in the presence of alkalies. It is used either as a solution or in the form of red or blue test papers. A chemist neutralizing an acid solution adds alkali until the red of the litmus fades to violet; one more drop turns it blue. With test paper, the solution is shown neutral when neither the red nor the blue is changed by moistening with the solution. See LICHENS.

LITTLE FALLS, N. Y., in Herkimer County, in the east-central part of the state, is situated in a narrow pass between foothills of the Adirondack and Catskill mountains. Through this natural gateway runs the Mohawk River, the Erie Canal, the New York Central and the Little Falls & Dolgeville railroads and the New York State Railway, an electric line. The population, which in 1910 was 12,273, was 13,451 (Federal estimate) in 1916.

A portion of this picturesque city is built upon the steep sides of the hills. Prominent public buildings include a city hall, a Federal building, Y. M. C. A. building, Masonic Temple, Saint Mary's group of buildings—church, school and deanery, and a public library and a hospital.

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The Mohawk River here falls forty-four feet in less than a mile of its course, in a series of little cascades, which suggested the name of the town. By means of a dam power is furnished for industry. Sectional bookcases, incubators, knitting machines, bicycles, hammers, paper, lumber and knit and felt goods are the principal manufactures. Little Falls is the trade center for the surrounding agricultural country.

A settlement was made here by Germans in 1782, which was destroyed by British sympathizers and Indians. In 1790 the place was resettled; it was incorporated as a village in 1811 and as a city in 1895. W.E.W.

LITTLE ROCK, ARK., the capital of the state and the county seat of Pulaski County, situated in nearly the geographical center of the state, on the Arkansas River, 145 miles southwest of Memphis, Tenn., and 140 miles southeast of Fort Smith. Three railway lines, the Saint Louis, Iron Mountain & Southern, the Chicago, Rock Island & Pacific and the Saint Louis Southwestern, enter the city. In population Little Rock ranks first in the state; the Federal estimate of 57,343 in 1916 is a great increase from 45,911 in 1910.

Location. The city occupies both banks of the river and extends westward to the foothills of the Ozark Mountains. It was built originally on a rocky bluff fifty feet above the south bank. To early settlers this bluff seemed little compared with the bold elevation about ten times higher on the opposite bank, then three miles distant, which was called the *Big Rock*. Hence the town received the name of Little Rock. Fort Logan H. Roots occupies the site on the high bluff. The river, here spanned by four bridges, is navigable to Little Rock almost all the year. The principal park is in the heart of the city and covers thirty-five acres.

Buildings and Institutions. With the exception of the state university at Fayetteville and a branch of the Normal Institute for colored students at Pine Bluff, all of the state's institutions are located in Little Rock. Here are the state capitol, built of Arkansas marble, the school for the blind, the state penitentiary, insane asylum, deaf-mute institute and state reform school. The granite county courthouse, the Federal building, Board of Trade and Masonic Temple are among the notable buildings. Little Rock is the seat of the United States District Court for the state. It has a Weather Bureau station and a United States arsenal. For higher education there are the Arkansas Military Academy, a military training school for boys; Maddox Seminary, for young ladies, and Philander Smith College, for colored youth.

Commerce and Industry. Little Rock has an important trade in cotton, lumber, bauxite ore (largely used in preparations of aluminum and alumina and employed in lining furnaces exposed to great heat), and in agricultural and manufactured products. The surrounding country has a large yield of cotton, and upon it depend the leading industrial establishments of the city. These are gins, compresses, cottonseed-oil and cottonseed-cake factories, the output of oil being especially large. Besides these the city has railroad shops, bauxite-crushing plants, twine factories and creosoting plants, and in the vicinity are granite quarries. The recent establishment of five wood-working plants shows that the city is rapidly becoming a lumber center of importance.

History. A settlement was made here in 1814 In October, 1820, with a population of less than twenty, it became the territorial capital, but it did not become a town until five years later; in 1835, by special act, it was incorporated as a city. During the War of Secession Little Rock was taken by the Federal forces and it remained in their possession until the close of the war. Since 1880 the population of Little Rock has steadily increased. J.S.C.

LITURGY, *lit'ur ji,* from a Greek word meaning a *public service,* is a form of worship, especially applicable to the celebration of the Lord's Supper. The word is frequently used in the Old Testament with reference to the public ceremonies of the Hebrews; in the New Testament it denotes any form of divine worship. Modern liturgies may be divided into two great groups, the Eastern and the Western. The former includes the *Syrian rite,* a Syriac version of which is still used by the Maronite Church of Mount Lebanon; the *Persian rite,* which is in the Syriac language, and is now used by the sect of Nestorians, many of whom have recently joined the Orthodox Eastern Church and use its liturgy; the *Byzantine rite,* the most important of all the Eastern forms, used throughout the world in different languages, and which is the rite of the great Russian Church, of the Greek Church and of less important centers of worship; and the *Egyptian rite,* a version of which is still used by the Copts.

The Western liturgies consist of the Latin and the Vernacular, the former represented by the Roman Catholic mass, and the latter by the forms used by various Protestant churches. The first half of the nineteenth century wit-

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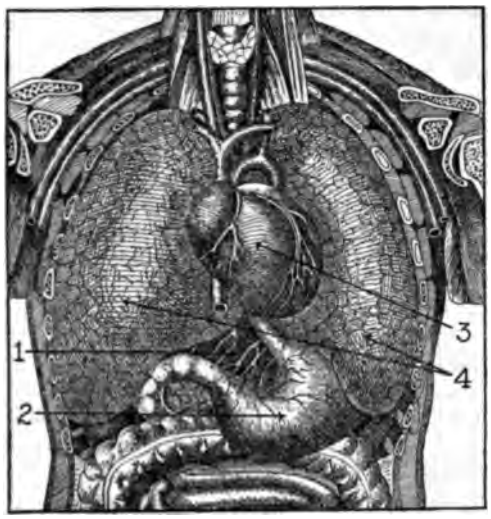
nessed a notable revival in the study of liturgies, both in England and America, and there is a growing disposition on the part of Christian churches generally to adopt liturgical services.

LIV'ER, the largest glandular organ of the body. It weighs from three to four pounds, is a soft and easily-crumbled mass, of a dark red or chocolate color. The liver lies on the right side of the abdominal cavity. It has a concave,



LOCATION OF THE LIVER
With respect to other organs: (1) the liver; (2) stomach; (3) heart; (4) lungs.

or outward-curved upper surface, which fits closely into the diaphragm. It is flat and irregular below and thicker behind, touching the intestines and the right kidney with the lower surface. Five ligaments hold it in place. It is divided by fissures, or grooves, into five lobes, the largest on the right. The hepatic artery and portal vein carry blood to the liver, and the hepatic duct conveys the bile to the gall bladder, a pear-shaped sac below the liver.

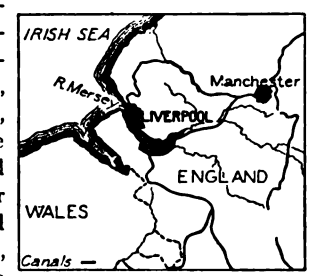
The liver has a number of very important functions. It receives blood from the stomach and the intestines through the portal vein, which divides in the liver into a network of capillaries. This blood in passing through the liver is freed of its waste matters and poisons; the liver cells also take out of the blood some of its sugar content, changing it into a kind of animal starch called *glycogen*. Glycogen is stored away in the liver cells to be given out again as sugar when it is needed by the blood. Sugars and starches in the blood are also changed into fat, part of which is poured into the blood and part stored away in the cells of the liver. This organ also manufactures bile, an important digestive fluid. Because the liver acts as a destroying agent of various poisons brought into the body, it often becomes itself diseased. That is why persons who have suffered from malaria, dysentery and other germ diseases are liable to have some form of liver trouble. Overactivity of the liver may cause the disease known as diabetes. J.H.K.

Related Subjects. Reference to the following articles in these volumes will broaden the reader's knowledge of this topic:

Arteries	Diabetes
Bile	Gall Bladder
Circulation of the Blood	Veins

LIV'ERMORE, MARY ASHTON RICE (1821-1905), an American lecturer and woman suffragist. She was born in Boston, and first came into public notice during the War of Secession. Her services on the Sanitary Commission and her speeches in support of the cause represented by that organization brought her into national prominence. She was active in the temperance movement for many years, and was well known as a writer on religious subjects. She was editor of the *Woman's Journal* of Boston at one time, and published a great many books. After the war Mrs. Livermore became an active advocate of woman suffrage, and her ability as a public speaker gained her notable success on the lecture platform.

LIV'ERPOOL, the second largest city in England and one of the greatest commercial centers in the world. It is situated on the River Mersey, three miles from its mouth, and is 201 miles northwest of London. In Liverpool "Trade is enthroned, with cotton as Prime Minister." However, not cotton alone, but nearly all the grain, dressed meats and other produce shipped from Australia, Canada and the United States to England enter through the port of Liverpool; while most of the exports from the kingdom to these countries leave from this city, whose docks are well equipped to handle this immense trade. They extend along the river for seven miles. Because of the strong tide at that point, forty great docks have been constructed, all joined together and surrounded by strong stone walls, within which are immense floodgates,



LOCATION MAP

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opened only to permit vessels to pass at high tide.

In addition to the city's export and import activities, considerable home trade has been developed through its extensive shipbuilding yards, iron and brass foundries, rice and flour mills, sugar refineries, glass works and watch factories. Not far from the busy water front are located the Exchange and the Town Hall. These buildings cover over two acres of ground. In the great news room of the Exchange, with its splendid decorations and fine stained-glass dome, merchants and brokers gather daily amid exciting scenes. The newer and better parts of Liverpool are on the highlands back of the river, where stand some of the finest public buildings in the world. Chief among these is [illegible] Hall, constructed from the prof- [illegible] the docks; it contains many [illegible] used for public gather- [illegible] purposes; its organ is one [illegible]

[illegible]

Southwestern Railway. It is 112 miles south west of Halifax by rail but only eighty mile overland. In addition to an extensive trade i fish and lumber, the town is known for it tanneries, pulp mills and allied industries. It harbor, directly on the Atlantic, is excellen Population in 1911, 2,109; in 1916, about 2,30

LIVERWORTS, *liv'ur wurts,* tiny plant closely resembling certain mosses. There ar several hundred varieties known, and som member of the family is found in every part c the world. They grow in damp, shaded place on rocks and the bark of trees, and sometime in water. The liverwort is a flat, lobed, leaf like plant, somewhat resembling the huma liver in shape. It was given its name becaus of this resemblance, and was once superst tiously supposed to be a cure for diseases of th liver. On the underside of the little flat lea are many tiny rootlets which hold the liverwor to the object upon which it is growing.

LIVINGSTONE, *liv'ing stun,* DAVID (1813 1873), pioneer missionary and explorer, wh made "Darkest Africa" known to the world, wa born at Blantyre, Scotland. His parents wer poor, and he went to work in a cotton factory at the age of ten. He struggled hard to educate himself [illegible]

[illegible] LIVINGSTONE

[illegible] commenced his mis [illegible] of Bechuana [illegible] Central Afric [illegible] appearance, but ha [illegible] everywhere mad [illegible] purity of thought [illegible] in all with whom [illegible]

[illegible] continuous struggl [illegible] to the civil [illegible] he won the friend [illegible] and said [illegible] penetrate [illegible] even th [illegible] paid hi

respect as the "very great doctor." To Livingstone are due the steps afterwards taken by the British to end human slavery in Central Africa; he caused the whole world to cry out in condemnation of the atrocities he witnessed.

In Bechuanaland he joined Moffatt, who had established a mission station; afterwards he married Moffatt's daughter, who accompanied him in some of his travels and aided him in his work.

In 1849 Livingstone pushed far north of civilization, beyond the tropic of Capricorn, and made the important discovery of Lake Ngami. In 1852 he started on an expedition which brought him to the then little known Zambezi.

MAP OF LIVINGSTONE'S EXPEDITIONS

He explored the upper reaches and traveled westward, eventually coming to Loanda on the Atlantic coast. From Loanda he journeyed entirely across the continent to Quilimane at the mouth of the Zambezi on the eastern coast. This journey was a succession of almost unsurmountable difficulties, overcome by the indomitable courage of Livingstone, who was tortured and emaciated by fever. His left arm, torn and shattered by an attacking lion, caused him constant trouble; food was scarce, and his medicine chest was stolen, but still he pushed forward. He discovered the now famous Victoria Falls on the Zambezi, and followed the course of the river to the coast.

He was later appointed British consul at Quilimane and was placed in charge of a party to explore Eastern and Central Africa, discovering Lake Shirwa and Lake Nyassa. In 1866 he started with another expedition to discover the true source of the Nile. For nearly three years nothing was heard from him. Pressing on against great difficulties and worn by want and sickness, he discovered the Serapula River and lakes Moeru and Bangweolo. He arrived at Lake Tanganyika in 1869 and remained there some time before continuing his explorations. In 1871 he was at Nyangwe, on the Congo, but was not certain that the river was the Congo. Returning to Ujiji, on Lake Tanganyika, he was met by H. M. Stanley, who had been instructed by James Gordon Bennett of the New York *Herald* to "go and find Livingstone." Stanley assisted Livingstone to replenish his stores, then returned to Zanzibar, while Livingstone resumed his explorations.

Another year of suffering proved more than his constitution could bear and he died in the village of a friendly chief on the shore of Lake Bangweolo. His devoted native servants buried his heart at the foot of the tree beneath whose branches the "great white doctor" passed away and carved a rough inscription on the tree. They then preserved the body and carried it reverently down to Zanzibar, where it was identified by the lion-torn left arm. The body was later taken to England and buried with great ceremony in Westminster Abbey, the final resting place of Britain's greatest men. He was the author of *Missionary Travels and Researches in South Africa* and *Narrative of an Expedition to the Zambezi and Its Tributaries.* His own works tell with the utmost simplicity and modesty of his accomplishments in the heart of the Dark Continent, results of a life work that make the name of David Livingstone honored throughout the world. F.ST.A.

Consult Stanley's *How I Found Livingstone.*

LIVRE, *le'ver,* an old French coin that differed in value according to the place of issue. The term was derived from the Latin *libra,* meaning *balance.* The standard livre was equal to four-fifths of the Paris livre, and its value compared with that of the franc was as the ratio of eighty to eighty-one; its equivalent in United States money is 19.3 cents. Under the first republic of France in 1795 the livre was superceded by the franc, which is now the unit of the monetary system of France and of the Latin Monetary Union, which comprises Greece, Italy, Belgium and Switzerland.

LIVY, *liv'i,* TITUS LIVIUS (59 B.C-A.D. 17), the most eminent of the Roman historians, was born at Padua, in the north of Italy. He belonged to a period filled with great writers, known as the Augustan Age. He was the son of wealthy parents and established himself in

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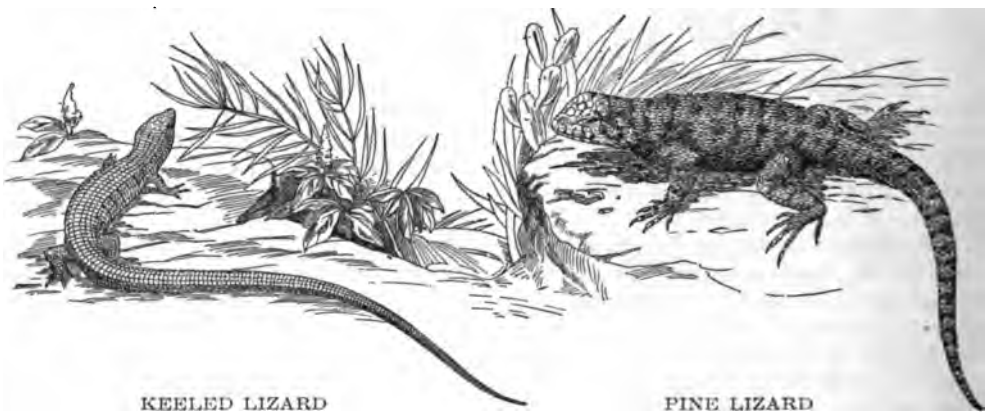
Rome, where he enjoyed the patronage of the Emperor Augustus. His history of Rome was written partly in Rome and partly in Naples, and originally consisted of 142 books, but only thirty-five have been preserved. *The Annals of the Roman People,* as he called his great work, begins with the foundation of Rome and nds with the death of Drusus, the brother of Tiberius. Portions of Livy's writings are quite generally used in colleges as a standard course for advanced classes in Latin.

LIZ'ARD, a group of reptiles distributed throughout the temperate and tropical regions, and consisting of many species. They show wide differences in size, structure and habits. In general the lizard possesses a long body with a protruding head, a distinct neck, four sprawling limbs, and eyes provided with movable eyelids or a protecting fold of thin skin. In size it ranges from tiny, wormlike forms to those six or seven feet in length. The skin, like that of snakes, is usually covered with scales, but these are much reduced or otherwise modified in some species. Some forms have lost one or both pairs of limbs, but the legless lizards may be distinguished from snakes in that the latter are capable of opening the mouth to a greater extent than can the lizards.



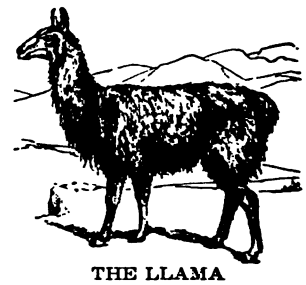
KEELED LIZARD PINE LIZARD

Lizards are black, red, yellow and white, with combinations of gray and brown; some species, notably the chameleons, possess the power of changing their hue to correspond with the color of the objects on which they lie. Many of these reptiles possess the power of snapping off the tail when that organ is seized by a would-be captor. Then the mutilated creature seeks the crevice of a rock, where it waits patiently for a new tail to grow. Lizards feed mostly on worms and insects, but sometimes they eat vegetable foods. They reproduce usually by hatching eggs; in a few species the young are born alive.

Related Subjects. Reference is made to the following lizards in these volumes:

Chameleon	Horned Toad
Gecko	Iguana
Gila Monster	

LLAMA, *lah'ma,* an animal belonging to the camel family, although smaller than the camel and less stupid in appearance. It has no hump on the back; the feet are more pointed and are divided into two toes, each with a strong, horny nail or hoof, with a thick pad beneath adapted for traveling in the mountains. Llamas live only in the western parts of Central South America, where the climate is temperate; they are the principal beasts of burden of the Indians of Peru and Bolivia. They are found in the higher ranges of the Andes, twelve to sixteen thousand feet above sea level, seldom descending lower than 6,000 to 7,000 feet.



THE LLAMA

Their food is mosses, lichens, tough, grassy reeds, and such shrubs as grow in high latitudes. If they find juicy food they seldom require water. Their hair is long and woolly and of a pale, reddish color, which is valued highly by the Peruvians, who weave the fleece into cloth. When cornered, llamas cluster in groups, with tails together and heads out to meet the enemy. Their only weapon of defense is their saliva, which they squirt through their teeth in showers as a Chinese laundryman sprinkles clothes. A drop of this saliva on any

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part of the body where the skin is broken produces a very dangerous sore, like the venom of a serpent. There are two wild species of the llama, the *vicuna* and the *guanaco;* and two domestic species, the *llama* and the *alpaca,* both probably derived from the guanaco. See VICUNA; ALPACA.

LLANOS, *lahn'ohz,* a name applied by the Spaniards to the vast treeless plains in Venezuela and Colombia, in South America. They extend inland from the delta of the Orinoco to the Yapura, a branch of the Amazon River, and have an area of about 300,000 square miles, or a larger territory than Texas or the province of Alberta. Heavy rains fall in the wet season, and the rivers flood the country; but after the water recedes rich grasses grow which provide food for herds of cattle and horses and flocks of sheep. Hot winds scorch the vegetation during the dry season, and the country becomes a desert; the animals then move where water can be found. The inhabitants of these plains are known as *llaners.* The plains farther south are called *pampas;* these are covered with a tall feathery grass, which, near the rivers, is green throughout the year. See PLAIN.

LLOYD GEORGE, DAVID. See GEORGE, DAVID LLOYD.

LLOYDS', *loids',* an insurance company of London, devoted primarily to marine insurance business. It is one of the greatest commercial organizations in the world, and is also known for its willingness to assume risks of unusual character. The firm, which was incorporated in 1871, originated about 1688 in the gatherings of a group of merchants who were accustomed to meet for business and sociability at Lloyd's Coffee House in Tower Street, London; from this famous coffee house the company took its name. The present headquarters consist of a merchant's room, library, restaurant and a room for the use of underwriters, in which auctions are also held. The association is made up of members and subscribers, and the government of the corporation is delegated to a committee. Subscribers pay an annual fee of about $25, but are permitted no voice in the management of affairs. Members are divided into two classes, underwriters and non-underwriters. Lloyd's receives daily reports of shipping in all parts of the world, which, with other information on that subject, are published every day. It also issues annually *Lloyd's Register of Shipping.*

While Lloyd's affairs are always handled for profit, they are conducted in accordance with good business methods. If a manufacturer in America or any other country wishes to insure his plant against fire for a large amount and his local insurance company for any reason cannot take the whole risk, it may ask a broker of Lloyd's to assume a certain part of it. When the broker receives this request, he turns it over to other brokers of the company, each representing a number of underwriters. Each representative designates how much of the total risk he is willing to assume, and when the whole sum has been subscribed the London company returns a *binder* to the local insurance agency. This binder means that Lloyd's covers the risk under the same conditions that the local company does, and while this does not actually insure the property, it confirms the judgment of the home agency. If the manufacturer's local insurance company withdraws its policy, that of the London agency is also withdrawn.

As an example of its unusual risks, such as no other company will consider, Lloyd's will insure a singer's voice, a dancer's foot, a pugilist's fists or the outcome of an election which promises to be very close; it once insured a valuable pear tree in California for $30,000 against fire and frost, and it is not unusual to insure a London merchant against loss of custom because of a storm on a special sale day.

LOADSTONE. See MAGNET AND MAGNETISM.

LOAM, *lome,* a soil compounded of sand and clay, sufficient sand being present to keep the clay from forming a solid mass. Carbonate of lime is usually present in small quantities, and the presence of decayed animal and vegetable matter, in the form of *humus,* adds greatly to the richness of the loam. All loam soils are suited to farming and gardening, those in which sand predominates being best for early crops. See SOIL.

LOB'BY AND LOB'BYING. A lobby is a spacious entrance way to an assembly hall or hall of legislation, conveniently used as a waiting room by those who have business to transact with officials. The term has also been applied for years to those persons who meet legislators for the purpose of influencing their votes on certain measures. "Lobbying" is the act of using persuasion and influence upon a lawmaker, either openly or in secret, to secure his support and vote. In national capitals and in every state and provincial capital during legislative sessions and in city council chambers are sometimes scores of men and women who

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are the acknowledged salaried agents of interests that wish to see certain laws enacted or certain bills killed. Besides these are persons appearing on their own responsibility in behalf of or in opposition to certain proposed laws.

It is not proper to conclude that lobbyists are necessarily corrupt. It is the privilege of citizens in person or through representatives to advise lawmakers as to their desires. So long as logical argument and persuasion are the means employed the occupation of the lobbyist is legitimate; only when in secret conferences votes are won by immoral proposals, such as the use of money or barter of place and power, does the "lobby" become an evil institution. The very general objection to the "lobby" is that its acts are in great part secret, and that the public cannot know the relations that exist between a legislator and a seeker after favors. The use of money or other valuable thing to secure legislative favors constitutes the crime of bribery, and in every country severe punishment, which may include both imprisonment and fine, follows conviction. E.D.F.

Consult Bryce's *American Commonwealth;* Brooks's *Corruption in American Politics and Life.*

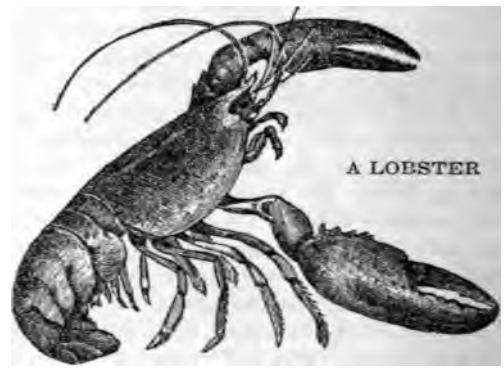
LOBELIA, *lo be'li a,* a widely-distributed group of herbs, which contains 400 known species. They are native to tropical and temperate climates, but are found chiefly in damp woods, swamps and marshes of North America and the north of India. Many favorite garden flowers belong to this group, among them the cardinal and the blue cardinal, which blossom year after year in the warmer parts of North America. The red lobelia blooms from the last of July until September, when its bright blossoms are readily distinguished in meadows and low, wet places. The stem is straight, and grows to a height of two to four feet, terminating in a long spike of brilliant cardinal flowers.

LOBELIA

The *Indian tobacco,* another species, which has blue flowers and an erect stem a foot high, was employed by the Cherokee Indians for medicinal purposes. From the roots and tops of many lobelias a drug is procured which was once widely used as an emetic, but is now valued chiefly as a remedy for asthma. The group was named for Lobel, a botanist under King James I.

LOB'STER, a large, long-tailed shellfish, extensively used as a food delicacy in cities. The supply is decreasing, and the price has risen over 400 per cent since 1880.

The principal swimming organ is the tail, which by a sudden bending underneath sends the animal swiftly backwards. The body is



A LOBSTER

divided into seven distinct sections, besides the thorax and head. The lobster has six pairs of mouth organs and two pairs of antennae. The first pair of long legs terminate in large claws, one of which is very thick and strong, and is used for crushing its food; the smaller claw is used for fighting or to seize its victim. The eyes are placed at the end of movable stalks, or *peduncles.*

The lobster changes its shell to accommodate its growth. The new shell begins to grow under the old one; the latter splits in two near the head, but that covering the tail is shed without splitting, the body being drawn out through the joints. As the new shell is very soft, the animal is unprotected after shedding the old one and is obliged to hide in crevices in the rocks to escape from hungry fishes and its own species until its shell hardens. The shell of the lobster is dark green, with dark blotches, but turns bright red when boiled.

The female lobster lays thousands of eggs which are glued together and attached to the underside of her body until they are hatched. The young resemble their parents, but lack the large claws. They swim near the surface of the water until they are about an inch long, and often take shelter under the mother's tail.

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THE LOBSTER INDUSTRY. Above: A lobster pond on a level with high tide, on the Bay of Fundy. Below: A hatchery in France

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SEED LOBSTERS. Each female begins laying eggs when eight inches in length, at the rate of 5,000 a year. When ten inches long, the number is doubled, and when a foot long her eggs may number 20,000.

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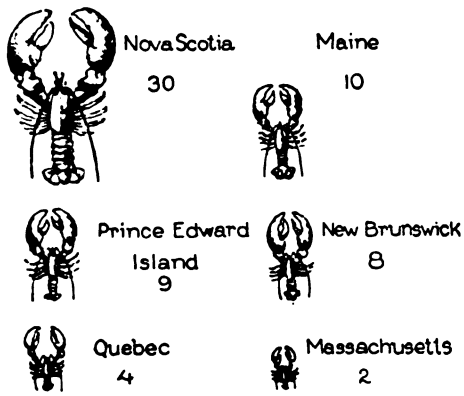
After about a month they remain near the bottom, where they can retire to safety when danger threatens. The species common to Atlantic waters is found from New Jersey northward, the best being taken along the shores of New England north of Cape Cod. They usually measure from twelve to twenty-four inches in length and weigh from two to fifteen pounds, though some much larger specimens are occasionally caught.

Lobster Fishing. Lobsters are caught in large numbers in wooden traps, called *pots,* which are made of wood, fitted at each end with a funnel-shaped opening covered with netting, with a hole in the center. The lobster



THE LOBSTER CATCH EVERY YEAR

The above figures represent the number of pounds per year averaged for a period of five years. Elsewhere than along the shores of the provinces and states named the catch is not important. North Americans eat over 50,000,000 pounds of lobsters every year and send large quantities to Europe.

pots are baited with dead fish, or almost any garbage, and are sunk to the bottom in deep water among the rocks where the animals live, and the spot is marked by wooden floats. The lobster can enter the trap easily, but cannot find his way out again. Every day or two the pots are raised to the surface of the water and their contents emptied into large floating cars, where the catch is confined until wanted for market. A peg is driven into the "thumb" of each lobster to prevent the claws from opening; this treatment prevents them from fighting and destroying one another. They are very quarrelsome, and by nature attack each other so viciously that they often lose their claws. Twenty to thirty million lobsters are caught every year along the New England and Canadian coasts, and the fishery is a source of great profit. Lobsters are counted among the "scavengers of the sea," as they feed on decaying animal matter. They also eat fish, clams, mussels and other mollusca.

Consult Herrick's *Natural History of the American Lobster;* Mead's *Method of Lobster Culture.*

LOB'WORM, the name of a family of worms that burrow in the sands of the seashore along the coasts of Europe and North America. The lobworm is from eight to ten inches long, and is much used for bait in deep-sea fishing. Its habits are similar to those of the ordinary earthworm, but it belongs to a different order. It has no eyes; the head is large and is armed with a long nose, or proboscis. The worm breathes through thirteen pairs of minute, gaily-colored tufts, and there are bristles on the rings of the body. At low tide it may be easily traced on the beaches by the coils of sand it leaves when crawling along. It is also called *lugbait* and *lugworm.*

LOCAL OPTION means *local choice.* The term refers particularly to the right of any political division, such as a township, city or county, to determine for itself the conditions under which intoxicating liquors shall be sold, or whether the traffic in them shall be prohibited. To put this temperance weapon into the hands of the people an act of the legislature is required, granting authority to communities to determine the saloon question, according to local sentiment, and naming the smallest political district in which local option may be put into effect. Then the people within such district may by majority vote confirm the right of local liquor dealers to continue their business or force them to abandon it. As one of the means of regulation of saloons local option is becoming an increasingly important political issue. See PROHIBITION; TEMPERANCE; ALCOHOLIC DRINKS.

LOCHINVAR, *lock'in vahr,* a story-poem by Sir Walter Scott which has rejoiced the heart of countless children. It forms a part of *Marmion.* Scott was very fond of the old ballads, and this poem, with its simple style, its swinging meter and the refrainlike last lines of its stanzas, is patterned after them. It has, however, none of the quaint, old-fashioned touches which mark the old ballads, and which some poets have introduced even into their imitations. The story is simple. The gallant knight Lochinvar has been spurned by the father of the lovely Ellen, but appears at the wedding feast and under pretense of dancing with the bride

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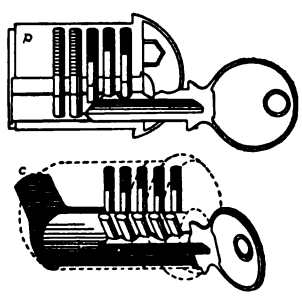
leads her to the door, lifts her on his horse and carries her away, all with her consent:

One touch to her hand, and one word in her ear,
When they reached the hall-door and the charger was near.
So light to the croupe the fair lady he swung,
So light to the saddle before her he sprung!
"She is won! we are gone, over bank, bush and scaur!
They'll have fleet steeds that follow!" quoth young Lochinvar.

LOCK, a fastening opened with a key or by mechanism easily kept secret, is a device as old as history, for the most successful modern door lock is a development of an old Egyptian device. It is almost impossible to open a good modern night latch without the proper key, and a time lock cannot be opened dishonestly even by those who know its exact construction.

When the key in an ordinary door or drawer lock is turned, the cuts in the former pass over *wards,* which are projections on the inside of the lock which will stop any key not having the same cuts. But by cutting away most of a key-blade, a *skeleton key* can be made which will open nearly any common lock.

Yale Lock. In 1860 Linus Yale, Jr., invented a lock now widely used, which cannot be opened with a skeleton. It is a cylinder within a cylinder. In the diagram, to turn the cam (*c*) which draws the bolt, the inner cylinder must be revolved. When the key is not in the lock the little pins (*p*), pressed down by the springs above them, hold the inner cylinder fast. Each pin is in two pieces, and the division is at a different height in each; when the proper key is inserted the pins are raised, so their divisions are exactly level with the division between the inner and outer cylinders. If a key differs 1/50 of an inch from the true key beneath any one of the pins, the cylinder cannot be turned.



MECHANISM OF A MODERN LOCK
Explanation of the figure is given in the article.

Combination and Time Locks. Because any lock having a keyhole can be picked by an expert, *combination* locks are used on safes. These are opened by a knob which must be turned back and forth certain distances known only to the proper persons. But as the combination can be learned by others, or may stolen, *time locks* have been devised which c not be opened even by their owners except certain hours. In spite of the obvious adv tages of time locks, they are little used outs of the United States and Canada.

LOCK, in canal construction. See CANAL.

LOCKE, *lock,* DAVID ROSS (1833-1888), American humorist and satirist, born in N York City, better known by his pen name, PETROLEUM VESUVIUS NASBY. He first attrac attention through his "Nasby" letters, prin in the Findlay (O.) *Jeffersonian* in 1860, later in the Toledo *Blade.* These epist which were supposed to be written by an lettered man who regarded whisky and slav with equal affection, were influential in moldi popular opinion, since they upheld the poli of the Lincoln administration throughout t war. His book *The Struggles—Social, Fina cial and Political—of P. V. Nasby* contains t best of his humorous works.

LOCKE, JOHN (1632-1704), sometim styled the "intellectual ruler of the eighteen century," was one of the most influential English philosophers. He was a native Wrington, in Somersetshire, and was educat at Westminster School and Christ Church C lege, Oxford. After his graduation he took the study of medicine. Under the patronage the Earl of Shaftesbury, whose physician he b came in 1666, he held various public offices, a in 1683 followed the earl to Holland, whith the latter had fled to escape arrest on t charge of high treason. In 1689 he return to England and in the following year publish his epoch-making work, *Essay Concerning H man Understanding.*

In setting forth his system of philosoph Locke undertook to answer the question, Ho do we come by our knowledge, and what a its limits? He was the first to speak of t "association of ideas," and took the stand th whatever any man can know, or reasonably b lieve in, or even conceive, is dependent up human experience. He maintained that birth the mind is as a tablet of blank pap whereon Experience is to write ideas. We m have ideas without having knowledge, but cannot have knowledge, or even opinion, wit out having ideas, for "having ideas" mea "speaking intelligibly." He believed educ tion should have as its aim the development "a sound mind in a sound body." These a other inquiries into the nature and limits human thought processes and education a

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embodied in his famous *Essay,* and his *Thoughts Concerning Education.*

Locke was influential as a moralist, an economist and as the leader of many public reforms, but he stands preëminent as a defender of individual freedom—religious, political and intellectual. This idea dominates all his writings, whether he chose the subject of *Civil Government,* or the *Reasonableness of Christianity.*

LOCK HAVEN, PA., the county seat of Clinton County, is a manufacturing city with a population of 7,772 in 1910. It is situated north of the geographical center of the state, on the West Branch of the Susquehanna River, at the point where it receives the waters of Bald Eagle Creek. Williamsport is twenty-five miles northeast, Philadelphia is 223 miles southeast and Erie is 223 miles northwest. The city is served by the Philadelphia & Erie, Bald Eagle Valley and the New York Central railways. The first settlement was made in 1833 by Jerry Church, of New England; it was incorporated as a borough in 1844 and as a city in 1876. In 1913 it adopted the commission form of government. Here was located the "lock" of the old West Branch Canal which afforded a "haven" to traffic down the river, hence the name of the city.

The principal manufactories are dependent on the resources of the surrounding country, which is a rich agricultural and lumber region; it also has fine deposits of hard and soft fire clay and red shale for making bricks. Bituminous coal beds, too, are found in the vicinity. Lumber and planing mills, fire-brick works, sewer-pipe plants, silk mills, paper mills, cigar and cigar-box factories, and tanneries are among the industrial establishments of the city. The Central State Normal School, with several fine buildings, is located here. The city also has a business college, a library, parochial and public schools, the $100,000 high school built in 1914 being one of the notable buildings. C.M.E.

LOCK'JAW, or **TETANUS,** *tet'anus,* a serious disease characterized by continuous rigidity of the muscles, which closes the jaws and holds the spine curved backward. It is caused by a germ (*tetanus bacillus*) which lives in earth or dust, especially around stables, gardens, in the dust of streets or houses, in manure and in splinters. These germs are often present in gunshot wounds. The disease is twenty times more frequent in the tropics than in temperate regions, and may select certain localities or districts. It gains entrance to the body through wounds, varying in size from a needle-prick to an operation wound. Rusty nails, as such, never produce lockjaw; but the germ of lockjaw, or tetanus, which is often found in earth, may be held in the rough places of the rusty nail, and this germ may infect the wound made by the nail, may enter the blood, and the poison which it manufactures may produce the symptoms of lockjaw. A clean rusty nail cannot infect.

Symptoms show themselves any time from six hours to nine days after infection, and begin suddenly with stiffness of the muscles of the lower jaw and neck. The teeth are set, the eyes are glaring and nostrils dilated; the upper lip is drawn up and back; the lower lip is projected down, giving a sardonic grin to the mouth. The muscles of the back and neck are drawn tightly, arching the body backward, the weight resting on the head and heels. There is high fever, violent muscular pain and inability to swallow or to talk, but the senses are clear until death, which occurs in ninety per cent of cases.

Treatment. Wherever there is any suspicion of tetanus poisoning use 1,500 units tetanus antitoxin as soon after the injury occurs as possible and keep the wound open by swabbing with zinc, iodine or carbolic acid, applying alcohol after one minute. Nerve-quieting medicines should be taken when needed. No person infected should attempt personal treatment, however, for even a skilled physician's powers are taxed to save the patient. C.B.B.

Consult Osler's *Modern Medicine.*

LOCK'PORT, N. Y., the county seat of Niagara County, situated in the center of the Niagara fruit belt, in the western part of the state, twenty-six miles north by east of Buffalo. It is on the New York State Barge Canal (which see) and on the Erie and the New York Central railroads. The population, which in 1910 was 17,970, was 19,879 (Federal estimate) in 1916. Lockport covers an area of eight square miles, and is partly built in terraces along the sides of "Mountain Ridge." The chief points of interest are the two great locks by which the canal descends sixty feet from the level of Lake Erie to the Genesee level, and the New York Central Railroad bridge, one of the widest bridges in the world, which crosses the canal in the heart of the city.

Among the prominent buildings are the Federal building, courthouse, public library, Y. M. C. A. building, city hospital, Odd Fellows' Home and the county jail and almshouse.

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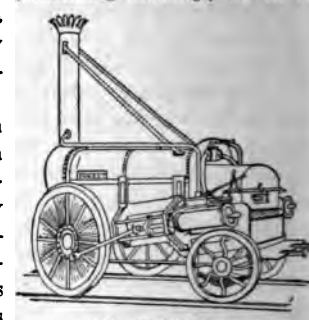
There are four parks, and extending from the town throughout the country are excellent roads. The city has a large trade in grain and fruit, quarries of Niagara limestone and sandstone, pulp-paper and fiber mills and manufactories of automobile supplies, milling and woodworking machinery, cotton and woolen batting, aluminum, glass, flour, brooms, wall board and textiles.

When the Erie Canal was opened in 1825 a settlement was made on the site of the present city. This was incorporated as a village in 1829 and became a city in 1865.

LOCK'WOOD, BELVA ANN BENNETT (1830-1917), an American reformer, lawyer and lecturer, and the only woman ever nominated for President of the United States, was born at Royalton, N. Y. In 1848 she was married to U. H. McCall, who died after five years, and in 1868 to Dr. Ezekiel Lockwood, who died in 1877. After teaching school for eleven years and graduating from Genesee College, Lima, N. Y., during that period, she took up the study of law, and in 1873 was admitted to practice in the District of Columbia. She was later admitted to practice before the Supreme Court of the United States, under a law admitting women which she was instrumental in inducing Congress to pass. Her activity in the causes of woman suffrage and temperance brought about her nomination for the Presidency in 1884 and again in 1888, by the Equal Rights party. She was a delegate to the International Peace Congress in 1908, and she lectured frequently on the reforms which she advocated. In 1913 she was a delegate to the Women's World Convention in Budapest, Hungary, and in the same year was elected a member of the International Peace Bureau at Brussels.

LO'CO-FO'CO, a nickname in American politics, first applied in 1835 to the radical faction of the Democratic party in New York state. In October of that year a meeting of New York Democrats was held in Tammany Hall for the purpose of effecting an organization opposed to the chartering of state and private banks by special legislation. The conservative element attempted to prevent this action, but, finding themselves outnumbered, turned out the lights and left the hall. Not to be outdone, the reform faction lighted candles with "loco-foco," or friction, matches, reorganized the meeting and proceeded with their business. These reform Democrats were at once called *loco-focos* by the Democratic press, and in course of time the Whigs applied the term to the Democratic party as a whole. The original loco-foco Democrats later took the name of Equal Rights party (see POLITICAL PARTIES IN THE UNITED STATES).

LOCOMOTIVE, *lo ko mo' tiv,* a machine driven by steam or electricity, used for moving cars upon a track. The word is formed by the union of two Latin words, *locus,* meaning *place,* and *motivus,* meaning *moving;* so in its broadest sense, a locomotive is any self-propelling vehicle.



THE "ROCKET"
The first Stephenson locomotive.

The first steam locomotive to run on rails was designed in 1803 by Richard Trevithick, a Welsh engineer. It was followed ten years later by *Puffing Billy,* which got its expressive name from the noise it made in hauling cars. The locomotive of the present, however, was developed in large part by the genius of an English engineer, George Stephenson, who won a prize of $2,500 offered by the Liverpool & Manchester Railway in 1829, by entering his *Rocket* in competition with other designs. The *Rocket,* though it looks crude to twentieth-century people, contained all the essential parts of a locomotive; moreover, it attained a speed of almost thirty miles an hour. It only remained for later engineers to develop still further the speed and hauling power of the Stephenson design. See STEPHENSON, GEORGE.

Structure. A steam locomotive consists of a frame, the boiler and engines supported by it, and a running gear on which it travels. The boiler is a long cylindrical body of steel, having a furnace at one end and a smoke box at the other. Smoke and gas from the furnace are carried to the smoke box at the front through numerous tubes, called flues, about two inches in diameter. These tubes, as well as the fire box, are surrounded by water, so that as much heat as possible may be absorbed. The smoke box is supplied with a netting to catch the large cinders and hot sparks, which might otherwise set fire to houses and dry grass along the right of way. The water in the boiler is heated and turned into steam.

The engine converts the pressure of the steam in the boiler into the force that rotates the drivewheels. It consists of cylinders in

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FIRST BUILT IN THE BRAIN OF MAN.

Above is the largest locomotive in the world. It weighs 816,000 lbs. Owned by the "Santa Fe" Railroad for mountain work. Below, Chesapeake & Ohio mountain type passenger engine, weighing 494,400 lbs.

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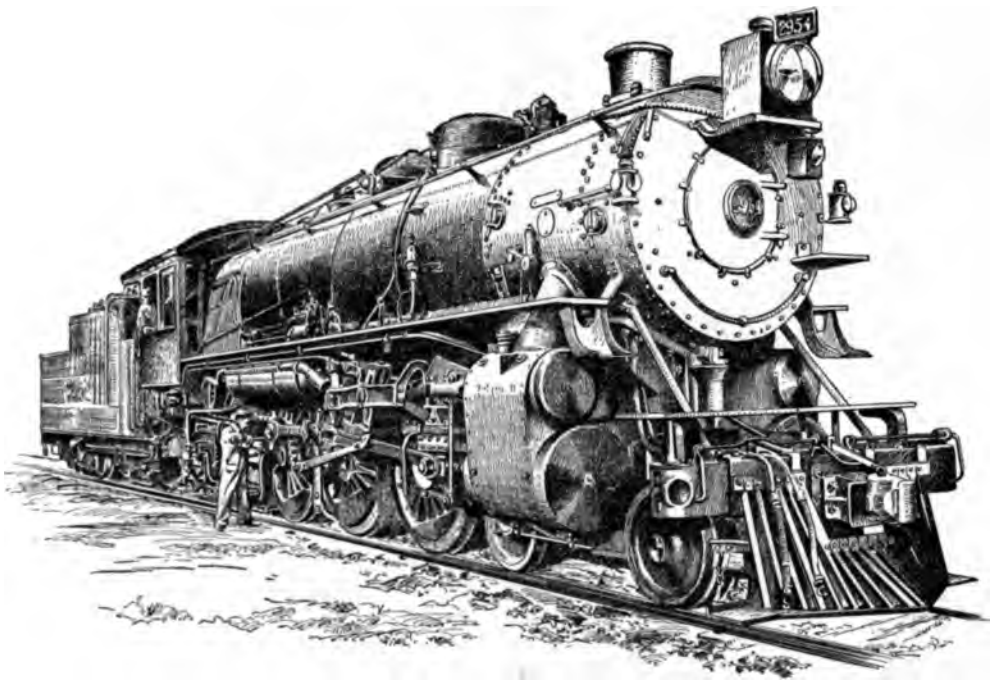
which the pistons slide, and rods connecting the piston with the wheels. The cylinders are carried on either side of the engine, near the front. Steam is admitted to them by means of a throttle valve carried in one of the domes on the top of the boiler and operated by means of a lever in the cab. The piston rod slides through a round hole in the back cylinder head, which is packed so as to be steam-tight. Through this rod, power is conveyed to the main driving wheels, and by means of connecting side rods to the other driving wheels.

Types of Steam Locomotives. The two main types of locomotives are those developed by the different needs of passenger and freight service.

Passenger Service. Passenger service may be divided into through service and local service. For through service, powerful locomotives of great speed are built to haul from six to fifteen coaches long distances. They are capable of maintaining a speed of seventy-five or eighty miles an hour. Many of them are now constructed with twelve wheels—three pairs of driving wheels, two trailing wheels under the cab, and four small wheels for guiding purposes. The guiding wheels are attached to the leading truck. The driving wheels on locomotives of which speed is required are much larger than those on freight locomotives, so the train may be carried forward farther with each revolution. On locomotives of the so-called Atlantic type and Pacific type, the driving wheels are occasionally eighty inches in diameter. Such locomotives may weigh as much as 425,000 pounds. For local service, locomotives having much smaller drivewheels and steam capacity are used.



A MODERN LOCOMOTIVE

The illustration is that of a locomotive over seventy-five feet long, which weighs 212½ tons. A man six feet tall and wearing a silk hat can stand erect in the smaller end of the boiler. A barrel could be placed within one of the cylinders. Fewer than ninety years of development lie between the above monster and the "Rocket" of 1829.

The working parts of the engine are connected by levers with the cab. These are, besides the *throttle valve* already mentioned, the *reversing mechanism;* the *air brakes,* which control the brakes of the entire train; the *injectors,* which admit water from the tender to the boiler; the *sanding device,* which occupies another dome on the engine and conveys sand to the track to prevent the wheels from slipping; the *whistle* and the *bell.* The engine is often oiled, too, by means of automatic lubricators operated from the cab. These lubricators provide a continuous flow of oil to parts of the machine where the friction is great.

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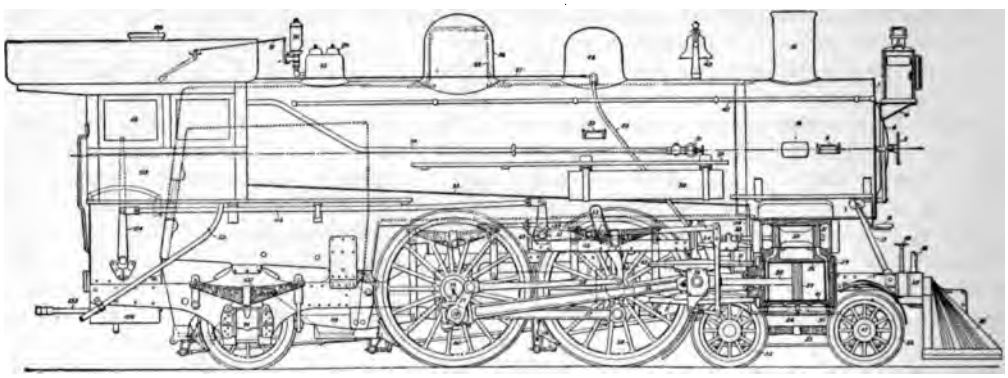

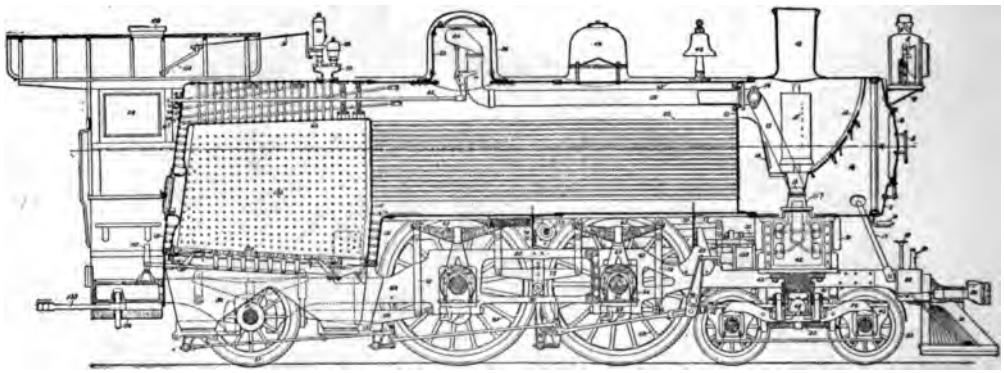

NAMES OF THE PARTS OF A LOCOMOTIVE

1. Headlight case
2. Headlight reflector
3. Headlight ventilator
4. Headlight bracket
5. Number plate
6. Boiler front door
7. Boiler front
8. Headlight step
9. Smoke box step
10. Smokestack
11. Petticoat pipe
12. Netting
13. Steam pipe
14. Diaphragm
15. Exhaust nozzle
16. Smoke box
17. Front boiler brace
18. Front bumper step
19. Flagstaff base
20. Coupler
21. Pilot
22. Front bumper
23. Front truck wheel
24. Front truck equalizer
25. Front truck spring
26. Cylinder bushing
27. Piston
28. Piston rod
29. Front cylinder head
30. Cylinder cock
31. Steam chest
32. Valve
33. Valve stem
34. Lap and lead lever
35. Lap and lead lever connector
36. Crosshead
37. Radius rod
38. Main air reservoir
39. Running board
40. Handrail
41. Cylinder
42. Saddle
43. Saddle center plate
44. Engine truck center plate
45. Engine truck axle box
46. Engine truck pedestal
47. Engine truck axle
48. Bell
49. Sand box
50. Sand pipe
51. Injector check
52. Sand box step
53. Link
54. Eccentric rod
55. Lifting arm
56. Lifting arm
57. Side rod
58. Front or trailing driving wheel
59. Dry pipe
60. Tube
61. Front tube sheet
62. Boiler shell
63. Driver spring
64. Driver spring saddle
65. Engine frame
66. Driving box
67. Driving box cellar
68. Pedestal binder
69. Frame brace
70. Boiler brace
71. Guide
72. Drive spring hanger
73. Driver equalizer
74. Lifting shaft compensating spring
75. Driver brake shoe
76. Driver brake lever
77. Eccentric crank
78. Main crank pin
79. Driving axle
80. Top-rail of frame
81. Bottom-rail of frame.
82. Main driving wheel
83. Steam dome
84. Throttle box
85. Throttle rod
86. Dome casing
87. Sand rod
88. Back frame
89. Safety valve
90. Whistle
91. Whistle rod
92. Safety valve dome
93. Safety valve dome casing
94. Injector delivery pipe
95. Cylinder cock rod
96. Ash pan
97. Trailing truck wheel
98. Trailing truck equalizer
99. Trailing truck axle box
100. Trailing truck spring
101. Injector suction pipe
102. Whistle lever
103. Cab
104. Reverse lever
105. Reach rod
106. Deck plate
107. Gauge cock
108. Cab ventilator
109. Grates
110. Grate shaker lever
111. Trailing truck axle
112. Back tube sheet
113. Crown sheet
114. Cylinder cock lever
115. Link bracket
116. Tee head
117. Exhaust pipe
118. Cab window
119. Turret head
120. Gauge bracket
121. Throttle lever
122. Water gauge glass
123. Reducing valve
124. Injector steam pipe
125. Injector
126. Engineer's valve for air brake
127. Engine step
128. Tailpiece
129. Fire door
130. Fire box
131. Water leg
132. Ash pan slide
133. Drawbar
134. Drawbar pin
135. Safety bars
136. Truck frame
137. Saddle flange
138. Driver brake cylinder
139. Lifting shaft
140. Trailing truck frame
141. Tailpiece

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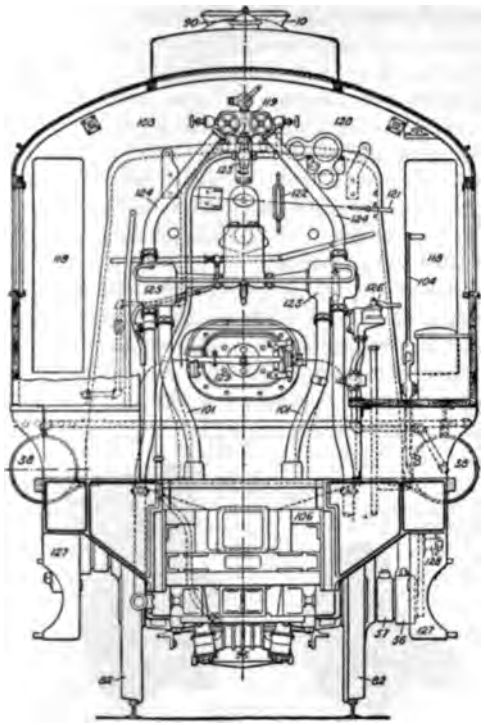

Freight Service. Great hauling power is needed in the freight service; accordingly the boilers of locomotives are large and the wheels relatively small. The Mallet articulated compound locomotive, which came into use in 1904, is essentially two locomotives, the rear end of one being attached to the forward end of the other. Some of these long locomotives are made with a joint, so they may bend in going round a curve. The most powerful locomotive ever built was turned out of the Baldwin Locomotive Works in 1914. It weighs 853,000 pounds and hauled a train of 251 loaded freight cars as a test. Modern freight engines cost $18,000 to $20,000 each; their life is about thirty years. See STEAM ENGINE; RAILROAD.

The Electric Locomotive. Of late years the electric locomotive has become a serious rival of the steam locomotive. It has certain points of marked superiority. It usually develops more hauling power in proportion to its weight. It does not "freeze up" in cold weather, like the steam boiler; it requires no coal, and in a mountainous country it creates a great saving by "regenerating" on slopes much of the power it has expended on steep grades. In cities like New York, where steam locomotives are not permitted on Manhattan Island, the smoke nuisance is greatly lessened.

Structure. The electric locomotive does not in the least resemble a steam locomotive; it looks from the interior more like an ordinary express car. The striking thing about such a locomotive is its simplicity of structure; it consists of a frame carrying one or more motors, geared to the driving axles, and a number of switches to regulate the power. It collects power either from a wire overhead or from a number of sliding "shoes" passing along a third rail, electrically charged.

The motors are driven by dynamos in a central power house. A motor is itself a kind of dynamo. For an explanation of how the dynamo converts mechanical energy into electrical energy and of how the motor converts electrical energy into the power to do work, see the articles DYNAMO; ELECTRIC MOTOR. The force is imparted to the driving wheels in one of several ways. In one type of locomotives, the revolving armature shaft carries cogwheels, which fit into toothed wheels connecting with the axles of the driving wheels. In another type, the rotating armatures impart a similar motion to the driving wheels by an arrangement of cranks and connecting rods like those seen in the steam locomotive. Motors of this type recently installed by the Pennsylvania Railroad weigh 45,000 pounds each.

Efficiency. The electric locomotives used by the New York Central Railroad are fifty-seven feet long and weigh 110 tons. They are driven by eight motors, each of 325 horse power. Locomotives of the type used by the New York, New Haven & Hartford Railroad have eight motors of 170 horse power each. They are capable of pulling a heavy train at the rate of sixty miles an hour.

The largest electric locomotives ever built were designed for the Chicago, Milwaukee & St. Paul Railway. They were constructed to haul freight and passenger trains through the mountainous regions of Montana and Idaho, where the extreme elevation is 6,300 feet. These engines weigh 260 tons each and are 112 feet 8 inches long. They have a pull of 3,440 horse power and were designed to supplant the huge Mallet engines in use up to 1915. See ELECTRIC RAILWAY.

Consult Sinclair's *Development of the Locomotive Engine;* Kirkman's *The Locomotive;* Prothero's *Railways of the World.*

LOCOMOTOR ATAXIA, *lo ko mo' tor a tak' si a,* a disease of the spinal cord, characterized by a staggering gait, in which the lower limbs do not seem to be under control. It occurs usu-

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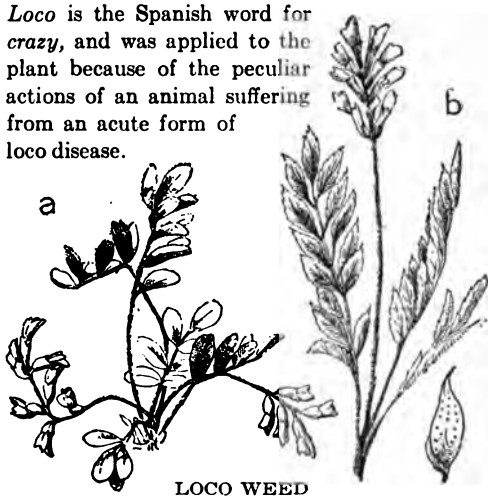
ally in men between the ages of thirty and fifty; the cause is not definitely known, but the most frequent provocative disease is syphilis. Many authorities believe this to be the sole cause. The malady may be from six to twenty years in developing.

The characteristic walk, in which the legs appear to be independent of their owner's will, the occurrence of a feeling of constriction about the waist (girdle sensation), and the gradual failure of sight may all be symptomatic of this disease; severe pains in the abdomen, occurring at irregular intervals and independent of any known cause, and called "gastric crises," may be present. Finally, if the suspect complains of "walking on cotton," a peculiar feeling in the soles of the feet, it may be accepted as evidence of locomotor ataxia.

No case has been known to recover, but treatment from the hands of a nerve specialist may arrest the disease. The patient may live for many years. It is highly important that the muscles be retrained and controlled when the patient is learning to walk again, and systematic exercises carried out under the instruction of a reliable physician have often accomplished very satisfactory results. W.A.E.

Consult Osler's *Practice of Medicine.*

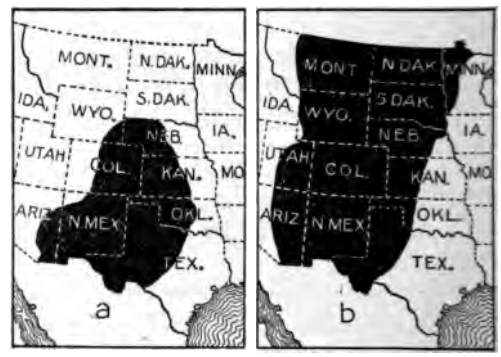
LOCO, *lo'ko,* **WEED,** a weed of the pea family, widely distributed over the grazing regions of the Rocky Mountains district, and greatly dreaded by Western stockmen because of its harmful effect on horses, cattle and sheep. *Loco* is the Spanish word for *crazy,* and was applied to the plant because of the peculiar actions of an animal suffering from an acute form of loco disease.



LOCO WEED
(*a*) White; (*b*) purple.

Symptoms of the Disease. Locoed horses show irregularities of gait, such as dragging the feet, and are unable to control and direct properly the action of the muscles. In going across a rut in a road a diseased horse may leap as if jumping over a ditch, or it may lift its feet very high in stepping over a low obstruction. A horse suffering from an acute form of the disease does not notice an approaching person until the latter is within a few feet, and it may then suddenly rear and fall over backwards. It is exceedingly dangerous to drive a badly locoed horse, because of its tendency to shy violently at imaginary objects. In the last stages of the disease the animal ceases to eat, and dies finally of exhaustion and starvation.

Locoed cattle also show a lack of muscular coördination. Sometimes a diseased steer will



DISTRIBUTION OF LOCO WEED
(*a*) Purple; (*b*) white.

rush about in a frantic manner and run wildly into obstructions, but usually these animals are dull and stupid. Violent shaking of the head, loss of flesh, staring eyes and rough coats are accompaniments of the disease, and in the end the animals die of starvation. Locoed sheep suffer from great weakness, as they often stumble and fall and can get up again only with difficulty. In general their symptoms are less marked than those of cattle and horses.

Though the United States Department of Agriculture has been investigating the subject since 1873, no specific medical cure for the loco-weed disease has as yet been found. Suggestions for treatment, however, are given in *Farmers' Bulletin Number 380,* issued by the Agricultural Department, Washington, D. C. This pamphlet may be secured by applying to that department.

Varieties of the Weed. The loco disease is caused by the *purple* and *white* varieties of the loco weed. The former is the more poisonous, but is eaten only by horses; the latter is liked by horses, cattle and sheep, and poisons all of them. The purple variety is a perennial found

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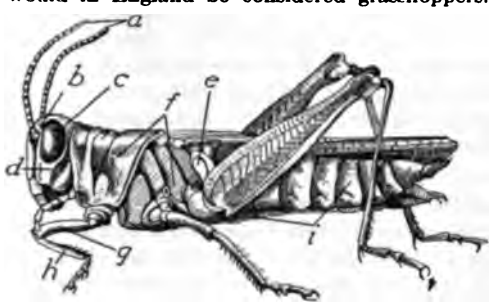
growing in patches on adobe soil, and attains a height of one foot. It bears deep purple flowers, short black, thick pods and leaflets thickly covered with hairs. The branches tend to lie rather close to the ground, giving the plant a sprawling appearance. Its blossoms appear about June 1 in the latitude of Colorado, but farther south the flowering season begins early in April.

The white loco is sometimes called the *stemless loco,* because it has no true plant stem. Its blossoms are borne on long flower stems that grow in a more or less upright position. In the regions of the Great Plains the plant bears white flowers, but in the mountains deep shades of violet and purple are common. This loco weed is of wide distribution (see map).

Consult "The Loco-Weed Disease," in *Farmers' Bulletin 380,* of the United States Department of Agriculture.

LOCUST, *lo'kust,* an insect known since remote antiquity for its crop-destroying habits. It belongs to the same family as the grasshopper—in fact, most of the American locusts would in England be considered grasshoppers.



PRINCIPAL PARTS OF A LOCUST

(*a*) Antennae	(*e*) Ear
(*b*) Ocellus (little eye)	(*f*) Thorax
(*c*) Compound eye	(*g*) Femur
(*d*) Head	(*h*) Tibia
	(*i*) Abdomen

The *seventeen-year cicada* (see CICADA) and other *cicadas* are often, though incorrectly, called locusts. (See article INSECT, subhead *Classification of Insects,* division 15.)

The locust plague in ancient Egypt is described in *Exodus* X so vividly that we know it to be the same as the one of modern times. The insects travel in swarms, settling down upon fields and systematically eating every stalk and leaf. One such swarm at the Red Sea was estimated to carpet an area of 2,000 miles. In the Mississippi Valley millions of dollars worth of crops were destroyed between 1870 and 1880 by the Rocky Mountain locust, but this region has suffered no serious invasion since 1876. On a summer morning in that year anxious farmers saw, like a thin, silvery cloud between them and the sun, countless millions of these dreaded creatures, whose fluttering, membranous wings had the appearance of an ever-shifting haze. Then they descended upon the growing fields of grain, and the season's crop was destroyed in a few hours. It is said that sometimes the locusts have appeared in such dense swarms they have impeded the movements of railway trains and obscured the brightness of the sun. As the main breeding grounds of the locust in Western United States are now in subjection to the plow, British Columbia is its principal North American home.

Several measures have been found useful in combating them. The eggs may be destroyed by harrowing and late fall plowing, and the newly-hatched young can be crushed between rollers. Some farmers scatter little pellets of bran and arsenic over the infested fields. The insects will eat this mixture, which is poisonous to them. The locust lays its eggs in the ground, enclosed in a case holding usually about twenty-five. In Cyprus, in the year 1881, over 1,300 tons of the little eggs were destroyed, but the next year there appeared to be as many of the insects as ever. Swarms have been known to travel from Saskatchewan to Texas, and others have been seen at sea 1,200 miles from land.

By drawing their hind legs across their wing covers, or when in flight by rubbing together their front and hind wings, swarms of locusts make a noise which is said to be deafening. In some countries locusts are eaten. Shakespeare, in *Othello,* speaks of food "luscious as locusts," and Saint Matthew says of John the Baptist that "his meat was locusts and wild honey." They are candied in China, and are an important article of the Filipino diet. Like the grasshopper, the locust has long hind legs with which it leaps, but its antennae (which see) are shorter than the grasshopper's. It differs from most insects in not passing through the usual stages of development (metamorphosis), the young *nymphs* being distinguished from the mature locusts chiefly by their lack of wings. C.H.H.

LOCUST, the name of a group of ornamental shade trees, nearly all of them thorny. They bear heavily-scented flowers, which hang in drooping clusters, those of most varieties resembling pea blossoms. The light blue-green leaves are compound, consisting of oval leaflets growing in single or double rows on opposite sides of a common long stem. The larger branches grow almost at right angles to the

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trunk, but the little, sharp twigs grow in all directions. The trees grow rapidly and spread by means of suckers springing from the roots, as well as from the scattered seeds. They bear much trimming and make a fine, close hedge. The wood is very hard, made so by mineral crystals deposited in the cells by the growing tree, and is a valuable material for building ships and making furniture, cogwheels, wagon hubs and spokes.

LOCUST
Branch, showing form of leaves and seed pods.

The locusts belong to the pea family, and are found in Europe, Asia, Africa, America and the West Indies. The best-known American varieties are the *honey locust*, the *yellow locust* and the *clammy locust*. The first is the largest, the second the most common and the last is a garden shrub or small tree cultivated for its beautiful pink, fragrant flowers.

LODGE, Henry Cabot (1850-), an American statesman and historian of marked ability, was born in Boston. He was graduated from Harvard in 1871, and for his thesis on *The Land Law of the Anglo-Saxons* received the degree of Ph. D. He studied law, and was admitted to the bar in 1876. From 1873 to 1876 he edited the *North American Review,* and for the following three years was university lecturer on American history at Harvard. He was elected a member of Congress from Massachusetts in 1887; after serving three terms in the House he was elected United States Senator in 1899, and was reëlected in 1905, 1911 and 1917. Senator Lodge is one of the most scholarly men who have served in Congress in the entire history of the nation. His published works include *Life and Letters of George Cabot, Life of Washington, Certain Accepted Heroes and Other Essays* and *Story of the Revolution.* He also edited the *Complete Works of Alexander Hamilton* and wrote a biography of Daniel Webster.

LODZ, *lawdz,* in Russian, *looj,* is a manufacturing town of Russian Poland, capital of the district of Lodz, situated eighty-seven miles southwest of Warsaw. Until the early part of the nineteenth century Lodz was only a small village in an almost impenetrable forest, but German enterprise introduced the textile industry and the village grew into a city with Americanlike rapidity. Now it is the second city of importance in Russian Poland, and because of the great amount of cotton, woolen and mixed goods manufactured, is called the *Manchester of Poland.* There are, in addition, chemical factories, boiler shops and silk- and linen-weaving mills. Lodz is a typical industrial city, without boulevards or exclusive residence districts. Its one main street is seven miles in length. The population is made up chiefly of Poles, Jews and Germans, and there are few Russians of unmixed blood. In 1914, during the War of the Nations, Lodz was occupied by the Germans. The Russians recovered it, but one month later lost it to the Germans a second time; the latter strongly fortified the palace and used it as a base for their drives against Warsaw. Population, 1910, 415,600.

LOEB, *lohb,* Jacques (1859-), an American biologist and physiologist whose studies in the origin of life have attracted wide attention. He was born in Germany and studied at Berlin, Munich and Strassburg, taking the medical degree in the latter city in 1884. He taught in the universities of Würzburg and Strassburg, engaged in physiological research at the Naples Zoölogical station, and in 1891 moved to the United States, where he became associate professor of biology at Bryn Mawr College. From 1892 to 1902 he was professor of physiology and experimental biology at the University of Chicago, and in the latter year was elected to the chair of physiology at the University of California. In 1910 he was made head of the department of experimental biology at the Rockefeller Institute for Medical Research.

Loeb's work in the field of comparative physiology and psychology has been of the utmost importance, and particularly by his researches into the physiology of protoplasm has he won distinction. The effects of light and of salt solutions on heart action, cells and tissue have been most interestingly shown by him. Working with the lower forms of animal life, such as sea urchins, he has demonstrated that it is possible to fertilize the female egg by artificial means. Using ultra-violet rays (see Radium) from a mercury arc lamp with an estimated candle power of 3,000, he exposed the eggs to the light for periods of 10 to 20 minutes, and in nearly all cases succeeded in producing changes which corresponded to those in the normal development of the egg.

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All his experiments tend to prove his thesis that "all life in all of its aspects is mechanistic;" in other words, that life may be reduced to or explained by chemical or physical principles or by a combination of these. All human conduct, in morals, aesthetics, religion and science is, according to his view, mechanistic. The value of his biological experiments is universally recognized, but opinion differs as to their interpretation.

Loeb has written extensively, both for magazines and in book form, about his experiments and his theories of life. *Artificial Parthenogenesis and Fertilization, Chemical Fertilization of the Animal Egg* and *The Mechanistic Conception of Life* are three books which created a vast amount of discussion.

LOESS, *lo'es,* the name given a rock which in structure is between the finest sand and clay. It was doubtless deposited in the form of silt and contained a good proportion of soil, in which hard, round lumps, or nodules, of limestone were imbedded. In some localities it also contains nodules of iron, which are usually hollow. When broken open they have the appearance of rusty iron.

In the United States loess is found along the Mississippi River, where it forms most of the bluffs on the east bank, also in Kansas and in a few other localities. It is of a light brown color, and where it comes to the surface forms bluff or vertical banks. In some sections it contains many small tubes in a vertical position, which are supposed to have been formed by the silt hardening around the small roots of plants. When well watered, loess forms excellent soil for crops. The largest deposits occur in China.

The origin of loess is not well understood. In some places it lies above the drift formed during the Glacial Period and in others it seems to have been formed at the same time as the drift. It is closely associated with the Glacial Period and was probably formed by running water or as silt deposited on the beds of lakes. See GLACIAL PERIOD.

LOFOTEN, *lo fo'ten,* or **LOFODEN,** *lo fo' den,* **ISLANDS,** an archipelago consisting of several large islands and many islets off the northwest coast of Norway, famous for the finest fisheries in the world. The principal islands are Öst-Vaagö, Gimsö, Vest-Vaagö, Flakstadö, Moskenaesö, Mosken, Värö and Röst. A line of coastwise steamers runs from Christiansand, calling at nearly all the islands on the coast. Moskenaesö is about forty-five miles from the mainland. The chief source of wealth is the cod fishing, carried on along the east of the islands in spring, when thousands of fishermen come from all parts of Northern Europe, doubling the usual population of about 42,900, and being accommodated in temporary huts and tents. The islands produce a little grain, barley being the principal crop, maturing in ninety days.

Between the islands of Moskenaesö and Mosken is the famous whirlpool, the Maelström, and navigation is dangerous in all the channels between the islands. Storms are severe, with frequent loss of life.

For particulars of the fisheries of Norway, with whose statistics Lofoten Islands are included, see NORWAY.

LOG, an apparatus by which a ship's rate of progress in the water is measured. The common log consists of a piece of board, about half an inch thick, cut in the shape of a quadrant of a circle of about six inches radius. A groove along its curved edges is filled with lead as a ballast, and it is so balanced as to float perpendicularly in the water with the greater part of it immersed. One end of the log line is fastened to the log by means of two legs. The log is thrown into the water and the length of line unwound from the reel gives the speed of the ship's sailing. The log line is divided into certain lengths by means of knots of colored cloth, which are proportionately equal to the number of geographical miles as a quarter or half minute is to an hour.

Log Book, a book that contains the official record of a ship on each voyage. In addition to the weather, there is transcribed daily every circumstance on board deserving of notice, such as mileage covered, offenses, deaths, births, marriages and conduct of seamen. The log book must be signed by the captain or officer on duty, and when the book is filled it is placed among the records of the ship's owners.

LO'GAN, JOHN ALEXANDER (1826-1886), an illustrious American military and political leader. James G. Blaine said of him that no other man in the history of the country had combined the elements of successful military and legislative leadership in such an eminent degree. His courage was of the highest order, and his will was indomitable, but he failed to crown his career with the honor so dear to American leaders, that of becoming the President of the United States. He was defeated for the nomination by Blaine in 1884, was nominated by acclamation for the Vice-Presidency,

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and with Blaine lost the election to Grover Cleveland.

In appearance he was striking; his most distinguishing feature was his hair, which, being unusually long and jet black, prompted his associates affectionately to call him "Black Jack Logan." In 1851 he was graduated from Louisville University and was admitted to the bar. He was a member of the Illinois legislature in 1852-1853 and in 1856-1857, and was elected to Congress in 1858 as a Douglas Democrat, where he served until he entered the army in 1861. He distinguished himself in the siege of Vicksburg, his command being the first to enter the town, of which he was appointed military governor, and he also accompanied Sherman in his march to Atlanta. As a Republican he was elected to Congress from Illinois for two terms and was a House manager of the impeachment of President Andrew Johnson. After his defeat for the nomination for the Presidency he was elected to the United States Senate. He died in Washington, December 26, 1886.

JOHN A. LOGAN

He wróte *The Great Conspiracy: Its Origin and History,* a book which was naturally a partisan account of the war.

LOGAN, MOUNT, the loftiest mountain peak in Canada, and with the exception of Mount McKinley the loftiest in North America. Its summit is 19,539 feet above sea level. It is situated in the extreme southwest corner of Yukon Territory, near the Alaska boundary, and is a part of the Saint Elias Mountains (which see). Mount Saint Elias, from which the range takes its name, lies a few miles to the southwest. Until 1898, when the altitude of Mount McKinley was ascertained, Mount Logan was believed to be the highest peak in North America. It was named for Sir William E. Logan (1798-1875), the first director, from 1842 to 1869, of the Canadian Geological Survey.

Descending from the southern slopes of Mount Logan, and extending into Alaska, is the great Seward Glacier, fifty miles long and more than three miles wide at its narrowest point, one of the most magnificent Alpine glaciers in North America. It is one of the feeders of the Malaspina Glacier (which see), and was named for William H. Seward, the statesman who negotiated the purchase of Alaska by the United States.

LOGAN, UTAH, the county seat of Cache County, is twenty-one miles south of the Idaho state line, sixty-nine miles north of Ogden and 100 miles north of Salt Lake City. It is on the Logan River, which flows into the Great Salt Lake, and on the Oregon Short Line Railroad. The city has a street railway system and an interurban line, the Ogden, Logan & Idaho Railway. The population, which includes a number of Scandinavians and Germans, in 1910 was 7,522.

Logan is finely situated at the northern end of a fertile valley nearly fifty miles long and ten miles wide, a great tract irrigated by springs and melting snows of the Wasatch Mountains. Here are situated the Utah Agricultural College; the Brigham Young College (Latter-Day Saints), a normal school and the New Jersey Academy (Presbyterian). The Federal building, erected in 1911 at a cost of $60,000, the Courthouse, the Temple and Tabernacle of the Latter-Day Saints, the Utah-Idaho Hospital, and the Carnegie Library, constructed in 1916, are buildings of note.

The city is the commercial center of Northern Utah and Southern Idaho. Agriculture and stock raising are the principal industries. Sugar beets, alfalfa, wheat and fruit are extensive crops, and thoroughbred horses, dairy cows and sheep lead the stock business. In Logan are flour mills, milk condensers, knitting factories and a large sugar factory. The value of the annual output of these industries is $2,000,000.

Logan was settled in 1859 and incorporated as a city in 1866. The commission form of government was adopted in 1911. M.R.H.

LOGANBERRY, *lo'gan ber i,* a valuable hybrid, or cross, between the blackberry and raspberry, named for its producer. It was developed in 1881, at Santa Cruz, California, by Judge J. H. Logan, from a seed of the Aughinbaugh blackberry accidentally fertilized from a neighboring raspberry, supposed to be the Old Red Antwerp. The Aughinbaugh is a species of the wild California blackberry, and was a chance seedling found about 1860 beneath the oaks at Alameda, California.

The loganberry is a strong-growing, dark green plant of the dewberry type, its fruit having the wild blackberry flavor. The loganberry fruit has many characteristics of both parents.

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When ripe it has a rich, dark red color, and sometimes is an inch and a quarter in length. Its flavor is improved by cooking. It has been widely distributed throughout America and Europe since 1893. If careful winter protection is given, the plants can be grown as far north as many parts of New England, Southern Canada and the Middle States.

LOGANSPORT, IND., the county seat of Cass County, in the northwestern part of the state, is seventy-seven miles northwest of Indianapolis and 117 miles southeast of Chicago. It is situated at the junction of the Wabash and Eel rivers, and is served by the Wabash Railroad and several branches of the Pennsylvania and Vandalia railroads and by interurban lines. The population in 1910 was 19,052; in 1916 it was 21,046 (Federal estimate). The area is about four square miles.

The principal buildings of the city are the Federal building, courthouse, Carnegie Library, Masonic Temple, high school building and Saint Joseph's hospital. The Northern Indiana Hospital for the Insane, located here, is an institution occupying over thirty buildings and 300 acres of land valued at $725,000. Spencer and Riverside parks together contain 240 acres.

Logansport is an important railroad center and a shipping point for grain, lumber, pork and other farm produce. The railroad shops of the Pennsylvania and Vandalia roads employ more than 1,000 men. The chief manufactures are lumber, automobiles, car trucks, machinery, water wheels, radiators, kitchen cabinets, soaps, brooms, and woodworking and foundry products. Limestone quarrying, water power and natural gas are the industrial assets of the city.

The town, which was established in 1828, was named in honor of Captain Logan, a Shawnee chief. It became the county seat of Cass County in 1827, was incorporated in 1831 and chartered as a city in 1838. J.D.D.

LOGARITHMS, *log'a rith'mz,* a system of tables by reference to which the multiplication and division of inconveniently long numbers may be accomplished by addition and subtraction.

A logarithm is what is known in algebra as an *exponent.* The symbol x^2 expresses the same thing as $x \times x$. Since a logarithm is an exponent, it follows the laws for exponents, and the preparation of tables of logarithms depends upon a principle used in algebra. This principle may be expressed as follows: $a^x \times a^y = a^{x+y}$. In algebra, in other words, quantities may be multiplied by adding their exponents. If we say $a^x = l$ and $a^y = p$, then the quantities x and y are the logarithms of the numbers l and p to the base a. Each number in a table of logarithms is accompanied by its logarithm. Instead of multiplying two long numbers, the calculator may simply add their logarithms; the number in the table corresponding to the new logarithm thus obtained is the product. In like manner, if the problem be one of division, the result is obtained by subtracting the logarithm of the divisor from that of the dividend and looking up the corresponding number in the tables.

In the common system of logarithms, the base is 10. The expression 10^2 is equivalent to 10×10, and the product is 100. Here 2 is the logarithm of 100 to the base 10. In like manner $10^3 = 1{,}000$. The logarithm of 1,000 (written *log 1,000*) is 3.

To obtain the logarithm of the root of a quantity, it is only necessary to divide the logarithm of the given number by the figure indicating the root to be taken. Suppose one desires to find the cube root of 271. A reference to the table gives the logarithm of 271 as 2.4330. Divide by 3 and the result is 0.8110, which is found to be the logarithm of 6.471. Therefore, the cube root of 271 is 6.471. Similarly, in raising a number to a given power, the student multiplies the logarithm of that number by the exponent indicating the power.

Logarithms are useful for all sorts of long and complicated problems. They are used constantly by scientists in their calculations and particularly by astronomers and engineers. They are indispensable in the study of trigonometry, and their use is learned by students while studying that branch of mathematics. Their great practical utility was first shown by John Napier, who published his tables in 1614. Many high schools do not teach logarithms, and boys and girls, as a rule, are never required to become familiar with this branch of higher mathematics. G.B.D.

LOGGIA, *lahj'a,* or *law'ji a,* an Italian word meaning *lodge* or *gallery,* is used to denote any roofed edifice open on one or more sides to the weather. It is thus applied to well-known buildings, such as the Loggia of the Vatican at Rome, the great Loggia dei Lanzi and the Loggia del Bigallo at Florence. The name is also given to an open arcade along the side of a building, to the large, ornate windows, consisting of several parts, found in old Venetian palaces, and in America to a room open on one side to the air.

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LOGIC, *loj'ik,* is pure reasoning, and to be logical is to argue reasonably upon a basis of fact in behalf of truth. Reasoning is the process by which conclusions regarding certain things are reached from what is already known about them. There are two processes, *induction* and *deduction,* by which these conclusions may be reached.

By *induction* a number of related facts about a certain thing are *drawn in* and put under a general law or truth. For instance, from the fact that heat expands iron, gold and platinum, the general conclusion is that *heat expands all metals.*

By *deduction* a particular conclusion about a certain thing is reached by *drawing out* facts from a knowledge of the class to which it belongs. Thus:

All animals with four legs are quadrupeds.
The horse has four legs.
Therefore, the horse is a quadruped.

The expression of an argument in this formal way is called a *syllogism.* Aristotle, a Greek philosopher (384-322 B. C.), originated the deductive form of reasoning.

LOG'WOOD, the most important dyewood known, so named because it is exported in logs. It is the red heartwood of a tree found in Mexico, Central America and some parts of the West Indies. The best logwood comes from Jamaica, Honduras and Santo Domingo, the Campeachy supply, formerly considered the best, is now almost exhausted. The texture is firm and the wood is heavy enough to sink in water; the color is a dark blood-red, which becomes almost black after long exposure. The infusion of the wood is also blood-red, which is readily yielded to boiling water. The shades produced vary from red to black; acids change it to the lighter shades, and alkalies to the darker hues. It is largely used for producing blacks on silk and wool and in the manufacture of ink. Medicinally it acts as a mild astringent, but it is now little used by physicians.

LOHENGRIN, *lo'en grin,* the hero of the German version of the legend of the knight of the swan. Besides the German, the legend has an English and a French version. The story is founded on two common themes of folklore, the changing of human beings into swans and the wife whose inquisitiveness results in disaster. The fable has been followed closely by Richard Wagner in his opera *Lohengrin.* The German story appears in the last stanzas of Wolfram von Eschenbach's *Parzifal,* in which Loherangrin, Parzifal's son, was sent from the castle of the Grail to help the young Duchess of Brabant. He arrives in a boat drawn by a swan, rescues the duchess from captivity and marries her. She begs him to tell her the story of his origin, which he does, after which he is forced to return to the Grail, by the terms of his vow. The widely-popular *Lohengrin Wedding March,* played at countless wedding ceremonies every year, is taken from Wagner's opera.

LOIRE, *lwahr,* in Roman times called the LIGER, is the longest river of France, having a total length of 620 miles and a drainage basin almost equal to one-fourth the area of the country. It rises in the Cévennes Mountains 4,500 feet above the sea, and flows in a northerly, then in a westerly direction, dividing France into two nearly equal parts, and emptying into the Bay of Biscay at Saint-Nazaire. Navigation on the Loire is attended with difficulties. In the wet season melting snows and heavy rains so increase the volume of the river that floods are of not infrequent occurrence, and during the period of summer drought it shrinks to an insignificant stream of sandbars and shallows.

Its estuary has been dredged to accommodate ocean vessels; dikes and embankments have been constructed at various points to control the floods, and a canal 125 miles in length has been built along the river to provide a reservoir for the overflow. Its utility has been further increased by canals connecting it with the Saône and the Seine, and by a canal between Roanne and Briare, the latter running parallel with it for 160 miles. The city of Nantes, thirty-seven miles from its mouth, is joined to the harbor of Brest by still another artificial channel.

LOK, *lohk,* or **LOKI,** *lo'ke,* in mythological legends of Northern Europe, was the spirit of strife and evil. Although a wicked deity and the embodiment of evil, he was supposed to be a very handsome, fascinating god. He shrewdly planned the death of Balder, when Frigga had induced all objects not to injure him. The mistletoe not being included, Loki made it into an arrow and gave it to the blind Hoder, who shot it at random. The dart struck Balder and killed him. Subsequently Loki was bound with ten chains and will continue chained, so the legend runs, until the twilight of the gods appears, when he will break his fetters; then the heavens will disappear, the earth will be submerged by the sea, and fire will consume the elements. Loki was considered far more clever

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than the other gods, and when he desired he could exercise his ingenuity in behalf of the other gods, and the results were most beneficial. He was usually occupied, however, in wicked scheming. See MYTHOLOGY; ODIN; BALDER.

LOM'BARDS, from *langobard,* meaning *longbeard,* a tribe related to the Germans whose original home was on the Lower Elbe. In the first century they fought their way southward and eastward till they came to the Roman border on the Danube. For several centuries they were held there, then in the sixth century they invaded and made themselves masters of Pannonia. Under King Albion (568-572) they conquered the northern part of Italy, which still bears the name of Lombardy. During the reign of King Liutprand (712-744) the Lombard kingdom reached its greatest prosperity. The powerful and troublesome exarchate of Ravenna had been subdued, the petty princes and rebellious cities were under control, and because the Lombards had turned Roman Catholic even the Pope was friendly.

Peace did not last long, for after Liutprand's death war between the different cities and the ambitious dukes began again. The Pope, beginning to be alarmed about these savages whose conquests were bringing them so uncomfortably close to his own lands, asked the Frankish king to help him. The Lombards were compelled to give up all further invasion and even to turn over to the Church some of the cities they had conquered. This kept peace till 774, when Charlemagne sent back his wife, the daughter of the Lombard king, Desiderius. In the war that followed this insult, the Lombards were beaten, and in 803 Charlemagne crowned himself with the famous Iron Crown of Lombardy (see subhead under CROWN). All that remains of this savage and once powerful tribe is the name they gave to Northern Italy and the set of laws of Rothari, which was used in the Middle Ages as a model of laws by several German kingdoms.

LOMBARDY, that part of Northern Italy which derived its name from the Lombards, who occupied it in the sixth century, and which now comprises the provinces of Bergamo, Brescia, Como, Cremona, Mantua, Pavia and Sondrio. Lombardy is the most important industrial region in Italy. It produces immense quantities of wine and silk and is noted for its cheese. It covers an area of 9,374 square miles, almost exactly the area of New Hampshire; in 1911 its population was 4,786,907, eleven times as great as that of New Hampshire.

LOMOND, *lo'mund,* LOCH, the largest of the Scottish lakes, famous for its beautiful scenery. It is encircled by ranges of hills, and its surface is dotted with many islands. A branch of the Grampian Mountains, rising on the eastern side, culminates in Ben Lomond, 3,192 feet high, on the edge of the lake. Loch Lomond is twenty-three miles long and seven miles wide at the upper end, although only half a mile wide at the lower, or southern, end. It lies between Dumbartonshire on the west and the county of Stirling on the east. The name of this picturesque lake occurs frequently in a beautiful Scotch song, the opening lines of which are the familiar words:

By yon bonny banks and by yon bonny braes,
The sun shines bright on Loch Lomond,
Where me and my true love will ne'er meet again,
On the bonny, bonny banks of Loch Lomond.

LONDON, *lun'dun,* the county town of Middlesex County, a customs port of entry and the commercial center of Western Ontario. It is situated on the Thames River, 114 miles southwest of Toronto, 111 miles northeast of Detroit and twenty-three miles north of Lake Erie, by rail. The following railroads enter the city: Grand Trunk, Canadian Pacific, and a city-owned and operated railroad to Port Stanley—London's harbor on Lake Erie—connects with the Pere Marquette, Wabash and Michigan Central. Radial and branch lines north, south, east and west center at this point, and the city railway connects with steamship service to Canadian and United States lake ports. The first settlement was made here in 1826 by Peter McGregor, a Highland Scotchman; the city was incorporated in 1854. The population in 1911 was 46,300; in 1916 it was estimated at 58,055.

Through its fine shipping facilities by rail and by water, London has become a manufacturing and distributing center of importance. Between 12,000 and 13,000 people are employed in the various industrial establishments, the largest of which are iron and brass foundries, factories for making biscuits, candy, cigars, stoves, clothing and boilers, printing houses and breweries. There are large wholesale houses here. The produce market is an important factor in the city's trade. According to estimates, over $2,000,000 worth of fresh country products are sold here annually. The cheese alone is valued at $1,000,000. London has a garbage incinerator and an abattoir. Noteworthy buildings are the post office, custom house, city hall, Masonic Temple, Y. M. C. A. building, the Armories and Wolseley Barracks. The benevo-

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lent institutions include Victoria and Saint Joseph's hospitals, an asylum with hospital buildings, Roman Catholic and Protestant orphanages and a home for aged people. Exceptional educational advantages are offered by the Western University, Huron College, Normal School, Saint Peter's Seminary, a collegiate institute, an industrial and arts school, medical and business colleges and a public library. London is the seat of an Anglican and a Roman Catholic bishop. Springbank Park is the largest park reservation. G.P.

LONDON, ENGLAND, the capital of the United Kingdom of Great Britain and Ireland and of the vast British Empire. The famous traveler-lecturer, E. Burton Holmes, thus summarizes its greatness:

> London is the most important place on earth. It is not only the most populous, but it is the greatest of great cities. No other city is the center of so many world-wide interests. Towards no other city do so many human beings look for inspiration, for commands and for rewards.

No other city contains so many spots that are associated with the lives of people who have played a prominent part in the history of the Anglo-Saxon race. No other city contains so many landmarks which remind one of poets whose works are among the masterpieces of the English language; of authors whose books have become the common heritage of the human race; of men of science who by their researches and discoveries have contributed to the advancement of mankind, and of men of great achievement in the domain of politics, commerce, finance and other branches of human activity.

Situation and Extent. London is situated in the southeastern part of England on both banks of the River Thames, about forty miles from its mouth. The Thames is a tidal river up to London Bridge, and is navigable for the largest seagoing vessels. This location explains the commercial importance of the place. Modern London consists of the "city" and of the administrative county of London, which together occupy an area of 117 square miles; it is about one-third as large in area as Greater New York and one-half smaller than the area of Chicago; in 1911 it had a population of 4,521,685. It is divided into twenty-eight separate boroughs or municipalities, besides the "city," each of them governed by an elected council and mayor. But outside these limits there is a wide area which, with the "city" and county, forms what is known as Greater London. This vast collection of buildings extends about fifteen miles in every direction from Charing Cross, the official center of the metropolis, and covers an area of 443,424 acres, or about 700 square miles, and had a population of 7,251,358 inhabitants in 1911. (It should be noted that Greater New York, which is under one central municipal government, has a greater population than London proper. See the article NEW YORK [CITY] in these volumes.)

The City of London. The city of London, the historic nucleus around which Greater London has grown, is situated on the north bank of the river. It covers an area of about 670 acres, a little over a square mile. Here are located the great financial institutions and the offices of the large industrial, commercial and shipping companies whose activities extend all over the world. The resident population, which is composed of caretakers, or janitors, and policemen, numbers about 20,000; the day population, representing employees of the great business houses, is over 250,000; while the number of people that pass each day within the square mile occupied by the "city" is over 1,000,000. The "city" of London is a separate municipality, having a civic corporation of its own, at the head of which is the lord mayor of London, who holds his office for one year.

London Seen from Trafalgar Square. London is situated on low ground and on that account one cannot get a general view of the whole metropolis, but a characteristic view of this wonderful city may be obtained from

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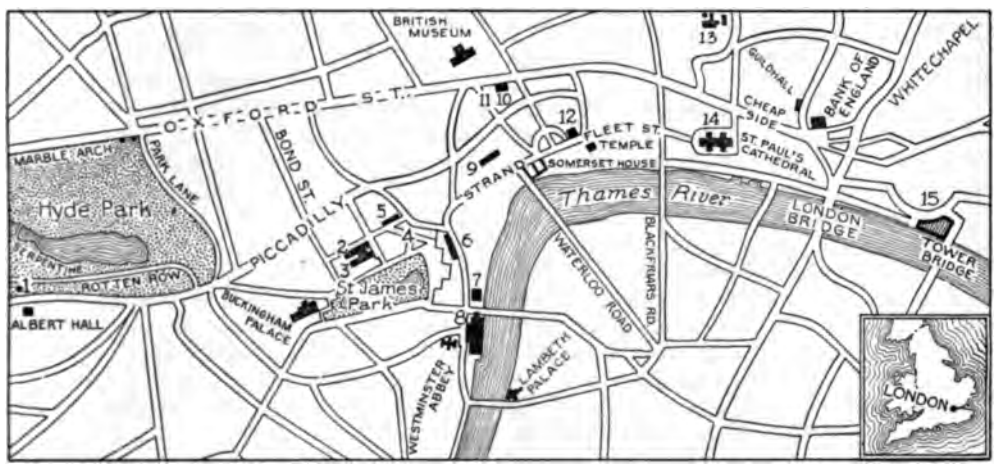
Trafalgar Square. The visitor standing in this square, which is one of the chief landmarks of the metropolis and is situated nearly in the center of Greater London, beholds a sight probably unequaled elsewhere in the world. In the middle of the square is the beautiful Nelson Column, erected to the memory of the greatest seaman of England. The base of this column is adorned by the four famous bronze lions, the work of Sir Edwin Landseer. Southward stretches Whitehall, a broad thoroughfare lined with solid blocks of buildings occupied by the chief government offices, where the business of the country and that of the whole empire are conducted. On the right-hand side of this thoroughfare extends the celebrated Downing Street, where is situated the Foreign Office, from which the international policy of the British Empire is directed. At the far end of Whitehall one gets a glimpse of Westminster Abbey (which see), and to the left of it the Houses of Parliament (see PARLIAMENT). To the west is the beautiful arch of the admiralty, so named because it adjoins the admiralty building. Through it passes a magnificent new avenue which leads to Buckingham Palace, the residence of the king. In front of the palace is the imposing Victoria Memorial, erected by popular subscription to the memory of Queen Victoria. Looking southeast through Northumberland Avenue one sees part of the Thames Embankment, which is one of the most magnificent boulevards in the world. Facing the square on the north side is the National Gallery, containing one of the most valuable collections of paintings in the world.

The Strand and Fleet Street. Going east from Trafalgar Square one enters the Strand, which is considered by many to be London's characteristic thoroughfare. Among the important buildings in this street are the Law Courts, a magnificent pile of buildings in the Gothic style, erected in the latter part of the nineteenth century. The continuation of the Strand is formed by Fleet Street, the largest newspaper publishing center in the world. Here are situated the editorial offices of the London newspapers, as well as those of the provincial, colonial and foreign newspaper correspondents.



MAP OF THE CENTRAL PART OF LONDON

(1) Albert Memorial
(2) Pall Mall
(3) St. James Palace
(4) Trafalgar Square
(5) National Gallery
(6) Horse Guards
(7) New Scotland Yard
(8) Houses of Parliament
(9) Covent Garden
(10) Lincoln's Inn
(11) Drury Lane
(12) Old Law Courts
(13) Charterhouse
(14) St. Paul's Cathedral
(15) Tower of London

Saint Paul's. From Fleet Street one enters Ludgate Hill, where Saint Paul's Cathedral is situated. The cathedral, completed in 1710 according to designs made by Sir Christopher Wren, is a magnificent building 510 feet in length, with a great dome 400 feet in height. This dome is visible from most parts of the metropolis and is one of the conspicuous sights of London. Going farther east one reaches the heart of the city, the Bank of England and the Mansion House, which is the official residence of the lord mayor of London.

The Guildhall. Not far from the Bank of England and the Mansion House is the famous Guildhall which has served as the council hall

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of the city for over 500 years. Here are held the most important civic functions, not only of London, but of the British Empire. One of the greatest honors that can be bestowed upon any man, British or foreigner, is to be entertained by the lord mayor of London at a public banquet at the Guildhall. This distinction was accorded Theodore Roosevelt, after his return from Africa in 1910. One of the great political events of the year is the banquet given by the lord mayor on the night of his inauguration, November 9. The speech delivered on this occasion by the Prime Minister or the Foreign Secretary is always awaited with the greatest interest, for as a rule it contains some important announcement defining the attitude of the government upon the chief questions of the day.

Other Important Streets and Buildings. Within the county of London alone there are 2,210 miles of streets, and only those of particular interest can be mentioned. Among these are Piccadilly, along which are situated many famous private residences and the most exclusive clubs, and Regent Street. At their intersection is Piccadilly Circus, one of the nodal points of the metropolis. Bond Street, where the most exclusive and fashionable shops are situated; Aldwych and Kingsway, two magnificent new thoroughfares, starting in the Strand; and Oxford Street and Holborn are other famous avenues. One block north of Oxford Street is the British Museum (which see). Among many other museums and art galleries are the Victoria and Albert Museum, which contains a valuable collection illustrating the development of the machinery used in many modern industries, as well as of the tools employed in a great number of the finer arts and crafts; and the Tate Gallery, noted for its collection of modern paintings.

Parks. Judged by the standard of old European cities, London is well supplied with parks. There are in and around London over 18,000 acres of parks, squares and open spaces maintained by local authorities. The most famous of the parks is Hyde Park, situated in the heart of the west end of London, and covering 364 acres. There is not another park in the world that presents such an animated and brilliant sight during the height of the London season, during the months of June and July. Every Sunday numerous open-air meetings are held in this park. Scores of speakers, addressing their audiences from improvised platforms, discourse upon all sorts of topics—religious, political, scientific and social. Adjoining Hyde Par are the extensive and beautiful Kensingto Gardens, where the imposing Albert Memori is situated. Another beautiful park is Regent' which contains a zoölogical garden with th largest collection of animals in the world; an the gardens of the Royal Botanic Society. O the southern side of the city is beautiful Green wich Park, with its famous Greenwich Observa tory.

More characteristic of London than its form parks are the heaths, or commons, which a preserved nearly in their natural condition fo the use of the people. The largest and mo beautiful of these are Hampstead Heath on th north, and Wimbledon Common, Putney Com mon and Black Heath, on the south.

Bridges. The oldest and most famous of th many bridges spanning the Thames is Londo Bridge. The old bridge, built of stone early i the thirteenth century to replace an older on built of wood, had a row of houses along it which gave it the appearance of a street. Th present granite bridge, built in 1831, was en larged in 1904. It connects the "city" with tw thickly-populated industrial boroughs, and th stream of traffic across it all day long is on of the unforgetable sights of London. An other beautiful bridge is the Tower Bridg built not far from the famous Tower of Lon don.

Fogs and Smoke. London is subjected i winter to fogs, which are made denser by th smoke which is continuously poured into th atmosphere from innumerable chimneys. In recent report the city medical officer of healt stated that in one month the amount of soot grit, dust and other matter registered as fallin in the city amounted to fifty-five tons. O account of this the city has a somber aspec and the buildings look dingy and unattractive Nevertheless London is one of the most health ful of the great cities of the world. This i the result of vigilant watchfulness over th water supply and the sewerage systems; o stringent building regulations, and of the at tention bestowed by the authorities upon al questions of public and private sanitation.

Commerce. In normal years London is th busiest port in the world, with an annual trad approximating $2,000,000,000. The Londo docks, which are provided with all the facili ties to load and unload the largest steamers i the shortest time, extend from near Londo Bridge down the river to Tilbury, a distance o over thirty-five miles. Three-fourths of th

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OUTLINE AND QUESTIONS ON LONDON

Outline

I. Location and Size

(1) Southeastern part of England
(2) On Thames River
(3) Area
(4) Population
  (a) Of the "city"
  (b) Of Greater London—largest in the world
(5) Comparison with New York

II. Description

(1) Chief streets and squares
  (a) Trafalgar Square
  (b) Streets leading from it
  (c) The Strand
  (d) Fleet Street
  (e) Piccadilly
(2) Famous buildings
  (a) Westminster Abbey
  (b) Houses of Parliament
  (c) Buckingham Palace
  (d) National Gallery
  (e) Law Courts
  (f) Saint Paul's
  (g) The Guildhall
  (h) British Museum
(3) Parks
  (a) Hyde Park
  (b) Regent's
  (c) Heaths or commons
(4) Bridges
(5) Fogs and smoke

III. Industrial Life

(1) Manufactures
  (a) Greatest manufacturing center in kingdom
  (b) Chief products
(2) Commerce

IV. Government

(1) The lord mayor of the "city"
(2) Separate boroughs

V. History

(1) Antiquity of the city
(2) Under William the Conqueror
(3) Disasters
(4) Steady modern growth

Questions

What honor was shown to a former United States President by the mayor of the "city" of London?

What famous document in the possession of the city dates back to the eleventh century?

How does London rank among the cities of the world as to population? As to commercial importance?

Where is the greatest newspaper center in the world located?

How long are the London docks? How does the city rank among cities of the kingdom as to commercial importance? Among those of the world?

What is the king's London residence called?

What is the weight of all the soot, dust and dirt which falls in London in a month?

What marks the center of Greater London? What is the chief ornament of this square?

When was the present London Bridge built? What was there noteworthy about the former one?

How large a resident population has the "city" of London? How greatly is this increased during the day?

What is London's most famous park, and how large is it?

How much longer has this city been in existence than has the second largest city in the world?

How much larger is the area of Greater London than that of the "city" and administrative county? The population?

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overseas trade of London consists of imports; more than one-third of the imports of Great Britain come in through London. Besides its overseas trade the coastwise shipping of London is greater than that of all the other English ports combined. London is also the center from which radiate all the great railroad lines of the United Kingdom.

Industry. London is the largest manufacturing center in the United Kingdom and one of the most important in the world, although this fact escapes notice in the vastness of this city. Among the thousands of establishments, each of which employs hundreds of people, are breweries, distilleries, sugar refineries, tanneries, shipyards, publishing and printing houses, and factories, producing practically all commodities in common use.

History. London was a good-sized trading place as early as the first invasion of the Romans, in 55 B.C. It became the capital of the kingdom of Alfred the Great in the ninth century, and in 1066 received from William the

LONDON
At the time of Shakespeare's death.

Conqueror a charter which has never been destroyed. With the settlement of the Normans there began the erection of larger and more imposing churches, monasteries and public buildings. Wars, epidemics, famines and fires hindered the city's growth throughout the Middle Ages and well into the modern period; late in 1664 a great plague broke out that carried off over 100,000 people in six months, and in 1666 a fire swept away the greater part of the city. As in many other cases, however, a new and better city rose from the ruins. Streets were made wider, and more substantial buildings were erected. Since the beginning of the nineteenth century London's growth in population and wealth has continued with little interruption.

The reader will find many intimate and fascinating descriptions of various parts of London and its outlying towns in the novels of Dickens. A recent book of great interest is Edward V. Lucas' *A Wanderer in London.* O.B.

Consult Mitton's *Children's Book of London;* Douglas-Irwin's *History of London;* Hare's *Walks in London.*

LONDON, JACK (1876-1916), a writer of novels and short stories, who probably put into his books more of his own life than did any other American author. *The God of His Fathers, A Daughter of the Snows, The Children of the Frost, The People of the Abyss,* all grew out of his own experiences. In *The Son of the Wolf* and *The Call of the Wild,* Alaskan stories, the author gave his own actual experience in the country which he described. *The Cruise of the Dazzler,* a boy's story, is the account of his own adventures as a boy on San Francisco Bay.

JACK LONDON

London was a native son of California, born in San Francisco, January 12, 1876. He attended college one year, but being of a roving disposition left school and became successively longshoreman, sailor, gold hunter in the Klondike, and wanderer. *The Call of the Wild,* an animal story depicting reversion to type, in which an intelligent, domesticated dog degenerated into a wolf, is a good example of the author's art in picturing the ghastly somberness of the frozen North. *The Valley of the Moon* chronicles the hardships of a young pugilist in the city and his ultimate success as a truck gardener in California; *The Game* is also a story of a pugilist. His books all show his hatred of sham and pretense and his deep sympathy with humanity.

LONDON COMPANY. In 1606 there was founded in London a corporation which had as its purpose the establishing of colonies in North America. This was shortly afterward divided into two branches, the Plymouth, or North Virginia Company, and the London, or Virginia, Company. The former was to plant a colony between 41° and 45° north latitude, the latter between 34° and 38° north latitude, while the branch which first carried out its purpose was to have added to its territory all the land between 38° and 41°. The London Company was the first to act, sending out a party of

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colonists and adventurers, 105 in number, late in 1606, and it was this party which founded Jamestown (see VIRGINIA, subhead *History*). A large proportion of these emigrants were of the gentleman class, unaccustomed to labor, and that fact accounts for the failure of the colony to grow and thrive.

The London Company, whose name was changed in 1609 to "The Treasurer and Company of Adventurers and Planters of the City of London for the First Colony in Virginia," had charge of the administration of the colony of Virginia until 1624, when its charter was withdrawn.

LONDON UNIVERSITY, an institution of London which differs from other universities in that it is an examining and not a teaching body. Connected with it, so closely that they really constitute a part of the institution, are a number of schools and colleges which prepare students for their examinations before the governing body. There are medical colleges, theological schools, agricultural and technical schools, and general faculties of arts and sciences, so that the scope is a very wide one. The various colleges had before the outbreak of the War of the Nations an enrollment of more than 5,000.

LONG, JOHN LUTHER (1861-), an American novelist who is most widely known for his *Madame Butterfly,* a story of Japan. Belasco's play, in which Blanche Bates starred, and Puccinni's opera, in which Geraldine Farrar had a notable success, were founded on this story. Long wrote, in addition, *Miss Cherry-Blossom of Tokyo, The Fox-Woman* and *War—or What Happens When One Loves One's Enemy,* and collaboroted with E. C. Carpenter in a play entitled *The Dragon Fly.* He was born in Pennsylvania, studied law, and engaged in practice in Philadelphia. He did not, like so many lawyers with literary tendencies, give up his profession for writing, but divided his time between the two.

LONG BEACH, CAL., a noted watering place on the southern coast of the state, about twenty miles south of the city of Los Angeles, in Los Angeles County. It has a delightful location on San Pedro harbor, and its beach is one of the finest on the Pacific coast. The locality abounds in scenic attractions, and the beach has a large pleasure pier, an auditorium which seats about 4,000 people, and many hotels and cottages. A number of electric lines enter the city from Pasadena, Los Angeles and adjacent towns, but travelers from greater distances arrive on the Southern Pacific and the San Pedro, Los Angeles & Salt Lake railways. Steamers ply between Long Beach and Santa Catalina Island, to the southwest. Although Long Beach is known primarily as a watering place, it is rapidly becoming a commercial center, and already has a fine trade in fruit, produce and lumber. The population increased from 17,809 in 1910 to 27,587 in 1916 (Federal estimate). In 1915 the city adopted the commission form of government.

LONG BRANCH, N. J., a city of Monmouth County and one of the oldest seaside summer resorts in the United States. It is located forty-five miles by rail and thirty-five miles by water south of New York City, and about seventy miles northeast of Philadelphia. It is on the Pennsylvania and the Central of New Jersey railroads and on electric interurban lines. During the summer season boats sail regularly between Long Branch and New York. The population was 13,298 in 1910; it was estimated at 15,395 in 1916. During the summer months there are frequently as many as 50,000 visitors.

The city occupies nearly nine square miles on a plateau extending westward from a cliff twenty to thirty feet above the beach and sea. Great bulkheads and jetties protect the land from the waves. Along the bluff is Ocean Avenue, five miles in length, and a board walk two miles long, which is a favorite promenade. Hotels and boarding houses, parks and casinos, handsome cottages, bathing houses along the beach and the adjacent pleasure resorts are the attractions of the city. The Federal building, city hall, public library, hospital, banks and school buildings are worthy of note. The Monmouth County horse show and races are held here each year in July. There is some manufacturing in the city, especially that of underwear and wearing apparel.

In 1734 the site of the town was an Indian fishing village and was called "Land's End." It was owned by a British officer before the War of Independence, when it was confiscated by the government and later developed by private enterprise as a bathing resort. The present name seems to refer to the "long branch" of the Shrewsbury River. Presidents Grant and Garfield spent vacations in Long Branch, and in Ocean Park stands a monument erected to the memory of Garfield, who died here in 1881. The place was chartered as a city in 1904, and in 1912 adopted the commission form of government. B.B.N.

LONGEVITY, *lon jev' i ti.* See LIFE, LENGTH OF.

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LONGFELLOW, HENRY WADSWORTH (1807-1882), an American poet whose verse is read and loved in countless homes and schools. Because of his appreciation of the trials, the hopes and the ideals that are common to all humanity, because of his love for all that is true and beautiful, and because of his gift for simple yet musical expression, Longfellow has won an enduring place in the affections of numberless readers in his own and in foreign lands. James Whitcomb Riley, who is as dearly loved by the children as is Longfellow, has written of the older poet:

His verse blooms like a flower, night and day;
Bees cluster round his rhymes; and twitterings
Of lark and swallow, in an endless May,
Are mingling with the tender songs he sings.
Nor shall he cease to sing—in every lay
Of Nature's voice he sings—and will alway.

Longfellow was born at Portland, Me., on February 27, 1807. His father, Stephen Longfellow, was a Harvard graduate, a prosperous lawyer and at one time a member of Congress—a kindly and lovable man; his mother, Zilpah Wadsworth, was a lover of nature, music and poetry—a fine and cultured woman, descended from General Wadsworth of Revolutionary fame, and from the John Alden and Priscilla whom Longfellow afterwards celebrated. The home life in the old Portland house was well-nigh ideal, and the poet carried with him all his life the influence of these early happy years. While fond of walking and of various out-of-door sports, he found his chief delight in music and in reading; and in his father's library he studied the choicest pages of English literature. The effects of this reading on his ambition became evident when there appeared, in 1820, in the Portland *Gazette,* a poem signed "Henry." While better than most boys of thirteen could have written, this poem had no real merit; it did not, as did some of Bryant's youthful productions, hold out promise of future genius.

His Early Life. At fifteen he entered Bowdoin College at Brunswick, Me., and there his geniality and uniform courtesy made him a general favorite. He was graduated in 1825, in the class with Hawthorne and Franklin Pierce, leaving behind him an enviable record for regularity and brilliancy. So good, in fact, was the impression made by him that very shortly after his graduation he was offered the professorship of modern languages at Bowdoin. He had pondered much over what profession he should adopt, and had finally decided to

HENRY WADSWORTH LONGFELLOW

study law in his father's office, but his enthusiasm and talent for literature caused him to accept the offer gladly. After some months of rest at home, he sailed for Europe, as the college authorities had suggested, to prepare himself for his new duties. He had a remarkable gift for learning and remembering languages, and between 1826 and 1829 traveled in France, Spain and Italy, reading and speaking

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the various languages almost without effort. His study went deeper than mere language rules, however; it mastered the literatures and the medieval legendary history of those countries.

When, at twenty-two, he returned to Bowdoin, it was to find himself perhaps the first scholar in America—the pioneer in giving to the still somewhat crude young country the culture of Europe. America was ready for such a service; Longfellow had grown up to meet a unique opportunity. He had also the ability and the methodical habits which made possible a prodigious amount of hard work, and there came from his pen, in rapid succession, prose sketches, reviews, translations of foreign poems and textbooks. His *Outre-Mer,* a collection of travel sketches somewhat after the manner of Irving's *Sketch-Book,* was also written during his years at Bowdoin.

In 1834 he received an offer of a professorship of modern languages at Harvard University, and the following year again set out for Europe. His wife, Mary Potter, whom he had married in 1831, accompanied him, and the

CRAIGIE HOUSE
The home of Longfellow at Cambridge, Mass.

trip seemed to contain as much of joy as of benefit. In London, the Longfellows found many friends and a delightful welcome, for, while the poet had as yet done little original work, the promise for the future was evident. They spent six months in Stockholm and Copenhagen, in a study of the Norwegian, Finnish, Danish and Swedish languages, and in October went on to Holland. Here Mrs. Longfellow fell ill and died. That this caused no pause in Longfellow's work does not prove him unfeeling. Perhaps there was in his life nothing more heroic than the silence, firm, but not bitter or sullen, with which he bore this grief and the other which came later.

After visiting other parts of the Continent and meeting many eminent men, Longfellow returned to his new duties. During the professorship of seventeen years at Harvard, he won the love of young and old alike, and tried, by no means in vain, to help the students to gain from their work in modern languages not mere technical knowledge, but some perception of the spirit and meaning of old-world literature.

A Great Career Begun. After living for some years as a lodger in the old Craigie House, Washington's headquarters in 1775, he bought the house, and to it, in 1843, brought his second bride, Miss Frances Appleton. With almost ideal domestic surroundings, and in constant touch with all of New England's famous group of authors, he felt himself thoroughly content and at his best, and the years that followed were the most productive of his life. Such poems as *The Reaper and the Flowers, The Psalm of Life, The Wreck of the Hesperus* and *Excelsior* had already won him fame, and when there appeared, in 1847, *Evangeline,* he became at once the most widely read and universally loved poet in America. This poem, the plot for which had been furnished by Hawthorne, who thought it could be told better in poetic form than in prose, has never lost its popularity. *Hiawatha,* a most remarkable success, followed in 1855, and in 1858, *The Courtship of Miles Standish;* many of his best-loved short poems were published in the intervals.

But all of Longfellow's interests were not literary. "The Children's Poet," as he is so frequently called, had the most constant and ready sympathy for his own children, the three girls of whom everyone knows from the lines,

> Grave Alice and laughing Allegra,
> And Edith with golden hair,

and two boys, Charles and Ernest. Sharing in their games, even coasting "for two hours on the bright hillside," as his journal records, sent him back to his work with renewed ability to write the poems in which children still delight. Not that the poems were written for children; but the poet had a nature so simple and genial, a mind which saw things so clearly, and a genius which described so well what others felt and saw, that even children can understand and love him.

The happy home life came to an abrupt and tragic end in 1861. Mrs. Longfellow had been making wax impressions to amuse the children, when a burning drop of wax fired her

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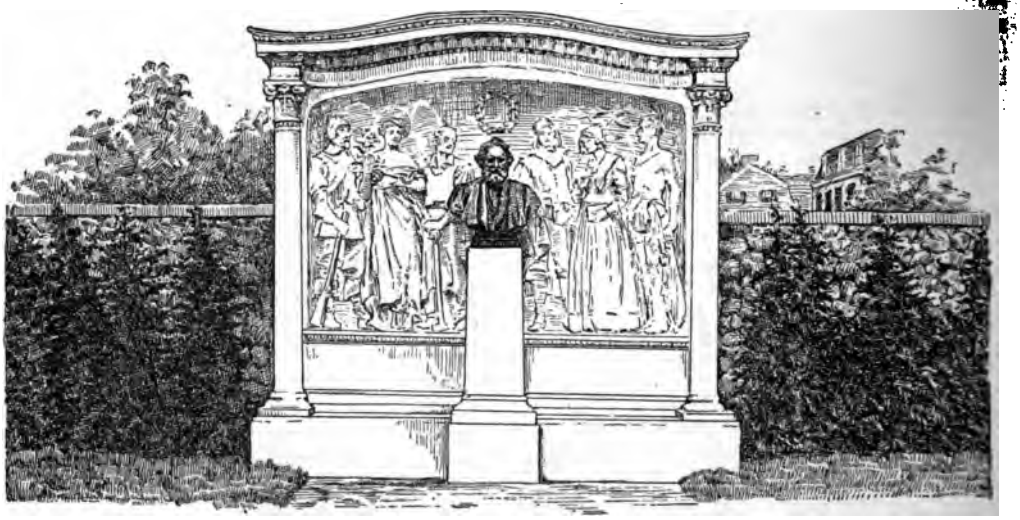
dress, and before her husband could extinguish the flames, burned her fatally. As he had met his other grief in silence, so he met this; but much of the light-hearted and buoyant character was gone from his verse, and it was only his courage which enabled him to go on with his work.

In 1863 the appearance of the *Tales of a Wayside Inn,* in which is included the popular favorite, *Paul Revere's Ride,* showed that he had once more in a measure found himself. His care for his children was constant, and in 1868-69 his three daughters accompanied him on a final visit to Europe. Edinburgh, Oxford and Cambridge universities honored him, and everywhere an enthusiastic popular welcome awaited him. The remainder of his life passed quietly, and to escape sad memories he did a vast amount of work in his later years. Besides original poems, there came from his pen an excellent translation of Dante's *Divine Comedy,* and translations, from eight different languages, of many poems which appeared in the *Poems of Places,* in thirty-one volumes, which he himself edited. To the end of his life he personally attended to his correspondence and received his numerous visitors kindly. One writer has said of him, "Perhaps the most remarkable traits in Longfellow's character were his accessibility and his charity." Rarely, if ever, did he refuse to see a caller, however much of an intrusion the call might seem to be, and children were received as courteously as were grown people. On the poet's seventy-second birthday, the school children of Cambridge presented him with an armchair made from the chestnut tree which he himself had made famous in *The Village Blacksmith.* The gift delighted him, and he wrote a poem about it, of which a copy was given to every child who came to see him.

Finally came illness, pain and feebleness, but they wrung no complaint from him, and his kindliness and courtesy never left him. His mind, too, remained vigorous, and *The Bell of San Blas* was written less than two weeks before his death, which occurred on the twenty-fourth of March, 1882. He was buried in Mount Auburn Cemetery, at Cambridge, near Agassiz, Sumner and Felton, his friends; and his bust was placed in the Poet's Corner at Westminster Abbey, an honor no other American has had.



LONGFELLOW MEMORIAL

Erected at Cambridge, in 1916. The sculptured figures, from left to right, are Miles Standish, Sandalphon, the Village Blacksmith, the Spanish Student, Evangeline and Hiawatha.

Summary. Longfellow's character and life have both been compared to a poem—well-balanced, beautiful, strong, with nothing to hide or excuse. Lowell said of him that his "choicest verse is harsher toned than he," and such was the impression of everyone who met him. His very appearance carried out this thought: of medium height, with features heavy, but sensitive, he had a dignity, a sunny gravity, which set him apart at first glance as a man of no ordinary character. Like Emerson, he was all his life innocent with the innocence of a child.

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Longfellow's Birthday

SUGGESTIVE PROGRAMS

The heights by great men reached and kept
Were not attained by sudden flight,
But they while their companions slept
Were toiling upward in the night.
—*Longfellow.*

I

Song, *O Hemlock Tree*.....*Longfellow*
The Wreck of the Hesperus..*Longfellow*
Longfellow.....*Katherine Lee Bates*
To H. W. L.....*Lowell*
A Psalm of Life.....*Longfellow*
Essay, *The Boy Longfellow*
Longfellow.....*William Winter*
The Poet and the Children.....*Whittier*
The Village Blacksmith.....*Longfellow*
Dramatization from *Evangeline*
Longfellow.....*Paul Hamilton Hayne*
The Luck of Edenhall.....*Longfellow*

II

Song, *The Bridge*.....*Longfellow*
The Bell of Atri.....*Longfellow*
Whose Shall the Welcome Be?.....
.....*Elizabeth Stuart Phelps*
Longfellow..... *H. C. Bunner*
Excelsior .....*Longfellow*
Essay, *The Friend of Children*
In Memoriam.....*Austin Dobson*
Longfellow Dead..*Paul Hamilton Hayne*
The Old Clock on the Stairs..*Longfellow*
Dramatization from *Miles Standish*
The Skeleton in Armor.....*Longfellow*
Vale et Salve.....*Edith M. Thomas*

Longfellow's work is well suited to the beginner in reading poetry. It is simple and easy to read, but musical and full of thoughts that appeal to any reader. The "Poet of the Commonplace" he has been called; and so, in a sense, he was, for he lifted commonplace things up into the realm of poetry, and brought to notice beauties before unthought of. Because they speak of home and of everyday work, of universal experiences, some of his shorter poems are probably more widely read, both in Europe and in America, than those of any other poet in the language.

It is rather whole poems than scattered sayings from Longfellow which have become familiar the world over, but the following quotations are among those which are so much a part of the language that the person who makes use of them scarcely stops to think who wrote them first:

> Look, then, into thine heart, and write!
>
> Lives of great men all remind us
> We can make our lives sublime.
>
> Into each life some rain must fall,
> Some days must be dark and dreary.
>
> This is the forest primeval.
>
> Blossomed the lovely stars, the forget-me-nots of the angels.
>
> There are no birds in last year's nest.
>
> Home-keeping hearts are happiest.

C.W.K.

Consult Higginson's *Henry Wadsworth Longfellow;* Perry's *The Centenary of Longfellow;* Trent's *Longfellow and Other Essays.*

LONG ISLAND, a long, narrow strip of land, a part of the state of New York, about 118 miles in length and varying in width from twelve to twenty-three miles, extending east from the mouth of the Hudson River. It is connected with New York City, across East River, by four suspension bridges (see BRIDGE, subhead *Suspension Bridges*) and is separated from Connecticut by Long Island Sound. The transportation facilities are of the best. A large portion of the island is under cultivation, and extensive market gardening furnishes large supplies of produce for New York and Brooklyn. Other portions of the island are comparatively wild. Brooklyn, now a part of the city of New York, is the principal city, but the island is famous for its great number of summer resorts and as the home of many thousands of people whose business interests are on Manhattan Island, the original New York City. See NEW YORK (City).

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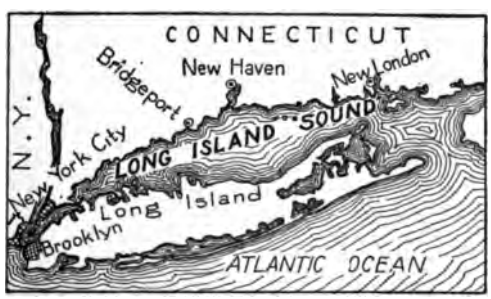
Long Island Sound, an arm of the Atlantic Ocean, 110 miles long and from twenty to twenty-five miles wide, which separates Westchester County, New York, and the state of Connecticut from Long Island. It is connected with upper New York Bay by the East River, and is fed by the Thames, Housatonic, Mystic and Connecticut rivers. Its shores contain excellent harbors. Large numbers of vessels navigate its waters, for it is a convenient "inside" route from New York to Providence and Boston. In the beautiful suburban villages which line its shores are homes of thousands of men whose business interests are in New York

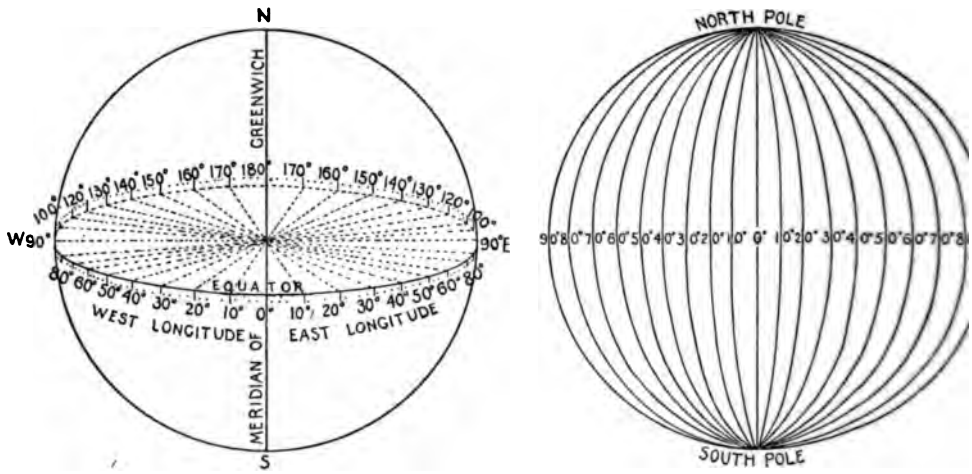


LOCATION MAP

City. These towns are famous for yachting clubs, golf links and clubhouses. On the Long Island shore there are valuable oyster beds and fisheries, and large areas are devoted to market gardening. On the Connecticut side are located a number of thriving manufacturing centers.

T.E.F.

LONGITUDE, *lon' ji tude.* If you were travel directly north from wherever you n are, and a second person fifty miles east of y and a third fifty miles west of you were s to travel north, your paths would all m at the north pole. Each would have follo a line of *longitude,* which is a north and so line along the earth's surface. The earth n



DEGREES OF LONGITUDE

be thought of as a huge ball divided into north-and-south sections, the lines between sections being the *meridians,* or principal li of longitude. Of course the earth has no r meridians, so for convenience most nati agree upon an imaginary meridian runn through Greenwich observatory, near Lond as the principal meridian, with others at int vals of $\frac{1}{360}$ part of the way around the world

A degree of longitude is the distance betw a point on any meridian and the point direc east or west on the next meridian. New Yo which is shown by the map to be 74° w longitude, is therefore 74 meridians fr Greenwich. A comparison with the ball make it plain that the space between two m ridians is greatest at the equator, and becon smaller as the poles are neared. Thus it that at New Orleans a degree of longitude about sixty miles, while at Winnipeg it is l than forty-five miles.

Related Subjects. The reader is referred the following articles:

Degree	Longitude and Time
Geography	Meridian
Greenwich	Pole
Latitude	

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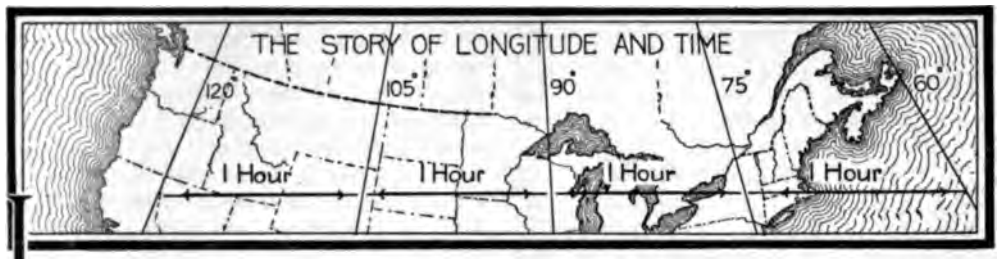

LONGITUDE AND TIME. Distances on the earth's surface are measured not only in miles, but in degrees of longitude and in time. As explained in the article immediately preceding, the earth is divided into 360 north-and-south sections, each one of which is a *degree* of space, marked by imaginary lines called *meridians;* also, a degree of longitude is the distance between a point on any meridian and the point directly east or west on the next meridian. Since the earth turns on its axis once in 24 hours, every point on its surface will describe a circumference (360°) in that space of time. In other words, it takes 24 hours for the entire 360° of the earth's circumference to pass beneath the sun. Then, since 24 hours of time are equivalent to 360° of space, 1 hour of time represents $\frac{1}{24}$ of 360° of space, or 15° of space. See DEGREE.

This means that the sun apparently travels through 15° in one hour. How far, then, will it travel in one minute and in one second? Clearly there must be smaller divisions of space measurement than the degree, just as there are smaller divisions of time than the hour. These divisions are minutes and seconds of space, the symbols of which are small, slanting marks written to the right of the number; *15 minutes* is 15′, and *15 seconds,* 15″. These must not be confused with minutes and seconds of time, for they are as different as hours and degrees. The minute of space is $\frac{1}{60}$ of a degree, and the second is $\frac{1}{60}$ of a minute. We have then the following table, the sign = meaning *is equivalent to:*

24 hours of time = 360° of space
1 hour of time = 15° of space
4 minutes ($\frac{1}{15}$ hour) of time = 1° of space
1 minute of time = 15′ of space
1 second of time = 15″ of space

As a common point from which to reckon longitude the English-speaking world has selected the meridian passing through Greenwich, England, near London, where there has been for many years a great observatory. The longitude of Greenwich is therefore 0°. See GREENWICH.

Practical Applications. It follows, then, that a distance expressed in degrees of longitude may also be expressed in measures of time, and vice versa. In the solution of problems based on the above principles, the following rules will be applied:

(a) To find the difference in longitude between two places when both are east or both are west of a given meridian, subtract the lesser longitude from the greater; if one is east and the otner west, add the two longitudes. To obtain the correct difference when the sum exceeds 180°, subtract the sum from 360°.

(b) If the time of a place is given, to find the time of a place east, add to the given time the difference in time between the two places (see (e) below). To find the time of a place west, subtract from the given time the difference in time between the two places.

(c) To find the difference in time when the difference in longitude is given, divide the difference in longitude, expressed in degrees, minutes and seconds, by 15. The quotient will be the difference in time expressed in hours, minutes and seconds.

(d) To find the difference in longitude when the difference in time is known, multiply the difference in time, expressed in hours, minutes and seconds, by 15. The result will be the difference in longitude expressed in degrees, minutes and seconds.

(e) Since the sun seems to move from east to west, sunrise will occur earlier at all points east and later at all points west of any given place. Clock-time, therefore, will be later in all places east and earlier in all places west of a given meridian. See STANDARD TIME.

ILLUSTRATIVE PROBLEM. When it is noon at X, a town whose longitude is 71° 3′ 25″ west, what is the time at Y, longitude 2° 20′ 20″ east?

71°	3′	25″ W.
2°	20′	20″ E.
73°	23′	45″, difference in longitude.

15	73°	23′	45″
	4 hr.	53 min.	35 sec., difference in time.

Since one of the two towns is west and the other east of the principal meridian (at Greenwich), the difference in longitude (that is, the distance they are apart), is found by taking the sum of their longitudes (Rule *a*). This difference is equivalent to 4 hours, 53 minutes, 35 seconds of time; the time difference is found by dividing the longitude difference by 15 (Rule *c*), and the divisor 15 is used because 1 hour of time is equivalent to 15° of space.

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Since the town Y is east of the town X, the time at Y is found by adding the 4 hours, 53 minutes, 35 seconds to the time at X (Rule *c*), making the time at Y 53 minutes, 35 seconds past 4 P. M. Likewise X is west of the meridian at Greenwich and Y is east of it; Y then has later clock-time than X (Rule *e*).

PRACTICE PROBLEMS. 1. Find the difference in time between—

New York, 74° 3′ W., and Berlin, 13° 23′ 53″ E.
Montreal, 73° 35′ W., and Paris, 2° 20′ 22″ E.

When it is 4 A. M. at Washington, 76° 56′ W., what time is it at Berlin, 13° 23′ 53″ E.?

2. Find the difference in longitude between two places whose difference in time is—

(*a*) 5 hr. 12 min. 18 sec.
(*b*) 6 hr. 18 min. 8 sec.

3. A vessel sailed from a port directly on a line of latitude for a certain distance, then turned and went due north to port. Here the captain found his watch to be an hour slow. In what direction did he sail first, and how many degrees?

4. A man travels until his watch is 1 hr. 20 min. fast. Does he go east or west, and how many degrees? B.M.W.

LONG PARLIAMENT, *par′li ment.* The last Parliament of Charles I well deserved this name, for it assembled in November, 1640, continued without interruption until 1652, and was not formally dissolved until March, 1660. It is, however, more celebrated for what it brought to pass in English history than for its length. It abolished the hated Star Chamber (which see); impeached and executed Strafford and Laud, the king's highly-unpopular ministers; declared that tonnage, poundage and ship money could not be collected at the will of the king for his selfish purposes unless Parliament consented, and deprived certain courts of their self-assumed powers. Then, to make itself perfectly safe, it passed a bill forbidding the king to dissolve Parliament without its own consent. But when these important matters were disposed of, the body found time and pretexts for violent squabbling, and at length an open break occurred between the members on the subject of the control of the army sent to suppress an insurrection in Ireland. The Cavalier party withdrew and held true to the king, against whom the Parliament waged successful war.

But religious differences sprang up. The Presbyterians of Parliament endeavored to put down the Independents, who were supreme in the army, and the result was that in 1652 the army expelled the ninety-six Presbyterian members and left what has since been known as the "Rump Parliament." It was this little body of about fifty men which put to death Charles I and established the Commonwealth. Cromwell found the Rump determined to hold on to its power at any cost, and therefore expelled its members in 1653, but in 1659, after Cromwell's death, they reassembled, the Presbyterians again joining the ranks. This resurrected body ordered a new election and dissolved itself on March 16, 1660.

Consult Gardiner's *The Great Civil War;* Firth's *Oliver Cromwell and the Rule of the Puritans in England.*

Related Subjects. The reader is referred to the following articles in these volumes:

Charles (England)	Cromwell, Oliver
Commonwealth of England	Restoration, The

LONG′STREET, JAMES (1821-1904), an American general, who was considered one of the hardest fighters in the Confederate army. His soldiers affectionately called him "Old Pete." He was born in South Carolina. After graduating from West Point, he gave his first service to his country in the Mexican War. During the War of Secession he took an active part in the battles of Bull Run, Williamsburg, those around Richmond, Fredericksburg, Gettysburg, Chickamauga and the Wilderness. In 1862 he was made a major-general in the Confederate army. After the war he filled several important government positions. President Hayes appointed him minister to Turkey, and in 1898, President McKinley made him United States Commissioner of Railroads, a post which he held at the time of his death.

LONGUEUIL, *loN geh′y′* or *loN′gay′y′,* the county town of Chambly County, Quebec. It is on the south bank of the Saint Lawrence River, opposite Montreal, with which it has ferry connection. Longueuil is served by the Quebec, Montreal & Southern Railway, and by the Montreal & Southern Counties, an electric line. It is a popular summer resort and residential suburb for Montreal business men. It has a Roman Catholic college and two convents. The principal industrial establishment is the branch plant of Armstrong-Whitworth & Co., the famous makers of armor plate and ordnance. Population in 1911, 3,972; in 1916, nearly 5,000.

LOO-CHOO, or **LU-CHU,** an archipelago in the Pacific Ocean, consisting of fifty-five islands lying between Japan and the island of Formosa, with a total area of 934 square miles. The most important island is Okinawa, on which the capital, Shuri, is situated. The southernmost islands are of coral formation; those in the north are of volcanic origin. The climate is pleasant and healthful, the soil fer-

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tile and well cultivated. Sugar is extensively exported, and sweet potatoes, rice, beans, barley, wheat and vegetables of many kinds are cultivated. The islands possess a strong and sturdy breed of ponies, and pigs are raised in great numbers.

The inhabitants are similar to the Japanese, with mild and courteous manners, and the total population is estimated at 453,500. The Loo-Choo Islands were incorporated into the Japanese Empire in 1879, China having renounced all claims to them by treaty in 1874.

LOOKOUT MOUNTAIN, a tall, narrow plateau of the Lookout Mountain range, 1,700 feet in height, about three and one-half miles southwest of the city of Chattanooga, Tenn., and the site of a national park. It is famed for the Battle of Lookout Mountain which was fought there.

SUNSET ROCK
Lookout Mountain.

Battle of Lookout Mountain, a battle of the War of Secession, fought on Lookout Mountain, November 24, 1863, between the Confederate forces under General Bragg and the Federals under General Grant, and sometimes called *The Battle above the Clouds.* It was one of the three encounters in the Battle of Chattanooga. See CHATTANOOGA, BATTLE OF.

LOOM. See WEAVING.

LOON, the popular name for the DIVER, which see.

LOQUAT, *lo'kwaht,* the fruit of an evergreen shrub which is a native of China and Japan and has been introduced into subtropical climates throughout the world. In its natural state the tree attains a height of twenty feet, but when cultivated seldom exceeds twelve feet. It has large, wrinkled leaves, with pear-shaped, yellow fruit of a pleasantly-acid flavor and about the size of a small plum. It flourishes in the Gulf states and in California; in the latter state several greatly-improved varieties have been produced. The fruit ripens in the very early spring. The loquat industry in the United States is of little commercial importance, averaging a few thousand boxes a year valued at about $8,000, the greatest yield coming from California; but the yield is slowly increasing. The loquat is cultivated to some extent in conservatories.

THE LOQUAT

LORAIN, *lo rane',* OHIO, a city in Lorain County, and a shipping port of Lake Erie, situated at the mouth of Black River, about twenty-five miles west of Cleveland. It has a fine harbor with more than six miles of dock frontage, has regular boat service, and is on the Baltimore & Ohio, the New York, Chicago & Saint Louis and the Lorain, Ashland & Southern railroads. The Lake Shore Electric road connects with Cleveland, Lorain, Sandusky and other cities. Population, 1910, 28,883; in 1916, by Federal estimate, 36,964.

An agricultural country surrounds the city, and it is in a region of natural gas. It is the shipping point for the Central Ohio coal fields, and exports large amounts of coal, lumber, iron ore and grain. An extensive shipbuilding plant, steel works, foundries and automatic-shovel and stove works constitute the chief industrial establishments. The city has a Carnegie Library and Saint Joseph's Hospital.

A Moravian mission in 1822 preceded the first permanent settlement. In 1836 the place was incorporated as the village of Charleston; the name was changed in 1874, and Lorain was chartered as a city in 1896.

LORD'S PRAYER. This is the name commonly applied to the familiar prayer which might perhaps more correctly be called the "Disciples' Prayer." For Jesus taught it to His followers as an example of the proper manner of prayer, and with its petition of "forgive us our trespasses" it is by no means a prayer which the Lord himself needed to utter. Nor did He intend that His disciples should use just this form and no other; He wished rather to indicate the elements which should appear in every true prayer—the recognition of the greatness and majesty of God, the plea for the establishment of His kingdom, and the request for spiritual and temporal aid.

The Lord's Prayer appears twice in the Gospels: in *Matthew* VI, 9-13, and in *Luke* XI, 2-4. The two versions are not identical, but there

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are certain signs in the originals which indicate to scholars that the slightly-differing forms were derived from one manuscript, and are not, as earlier critics held, reports of two distinct utterances of Jesus. The following is Matthew's form of the prayer, as it appears in the authorized and the American revised versions:

AUTHORIZED

Our Father which are in heaven,
Hallowed be thy name.
Thy kingdom come. Thy will be done in earth as it is in Heaven.

Give us this day our daily bread.
And forgive us our debts, as we forgive our debtors.
And lead us not into temptation, but deliver us from evil.
For thine is the kingdom, and the power, and the glory, for ever,
Amen.

REVISED

Our Father who art in Heaven,
Hallowed be thy name.
Thy kingdom come. Thy will be done, as in heaven, so on earth.

Give us this day our daily bread.
And forgive us our debts, as we also have forgiven our debtors.
And bring us not into temptation, but deliver us from the evil one.

LORELEI, *lo're lie,* a rock about 430 feet high, on the right bank of the Rhine River near Saint Groar. It is famous in song and story for its remarkable echo, which gave rise to the legend that the rock was the home of a siren who lured mariners to destruction by her

LORELEI ROCK

The fading light grows dimmer,
The Rhine doth calmly flow;
The lofty hilltops glimmer
Red with the sunset's glow.
—Translation from *The Lorelei.*

beautiful voice. As the vicinity of the Lorelei was a dangerous spot for navigation, the legend was easily believed by early peoples. The myth is the subject of a poem by Heine and of an incomplete opera by Mendelssohn.

LORIMER, *law'ri mer,* GEORGE HORACE (1868-), an American editor, journalist and story writer. His *Letters of a Self-Made Merchant to His Son* have been called a "modern Poor Richard's Almanac," and it was fitting that he should be called to the editorship of the paper founded and edited by Benjamin Franklin, the present *Saturday Evening Post.* Lorimer was born in Louisville, Ky. After graduating from Yale he accepted a position with Armour & Co. in their packing house at Chicago. Pork packing not appealing to his literary tastes, he resigned to engage in newspaper work. After several years' work in the journalistic field, Mr. Curtis, of *The Saturday Evening Post,* made him editor of that weekly magazine (1899), and it was for that periodical that Lorimer wrote the *Letters of a Self-Made Merchant to His Son,* which were afterwards published in book form. The *Letters* were very popular, as was also his *Old Gorgon Graham,* a second series of the *Merchant* letters. Both of these volumes are full of forceful maxims of the business world. Lorimer's admirable discrimination in selecting writers of fiction has helped to give the *Post* a foremost rank.

LO'RIS, an animal of the lemur family, native to Southern Asia, sometimes called the *slow lemur,* on account of its sluggish movements. It is about the size of a small cat, and has large, round eyes, soft, yellowish-gray fur and a broad, flat head with a white stripe between the eyes. It has no tail, and the toes are webbed together at the base. The loris sleeps in the daytime, rolled up in a ball with its head between its thighs and its feet clasped around the limb of a tree. It prowls around at night in search of food, which consists of young leaves and tender shoots, fruits, insects, birds and their eggs. See LEMUR.

THE LORIS

LORRAINE, *lo rane'.* See ALSACE-LORRAINE.

LORY, *lo'ri,* a group of Australian parrots, noted for their showy plumage, in which bright scarlet, green, blue and yellow are the dominant hues. The lory has a soft tongue with a brush-like surface, which indicates that its food is chiefly pulpy fruits, honey and plant juices, instead of the hard nuts and seeds which comprise the food of the common parrot.

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LOS ANGELES, *lohs ang' gel es,* or *los an' jel es,* CAL., according to the census estimates of 1916, was in that year the largest city in the United States west of Saint Louis. It is the county seat of Los Angeles County, and is situated 484 miles southeast of San Francisco and 781 miles southwest of Salt Lake City. The city's growth in population is proof of an unusual combination of natural advantages. In 1850 it was a town of 1,610 inhabitants. By 1890 the population was 50,395, and during the next ten years it had more than doubled, reaching 104,266. Another decade saw this figure increased to 319,198. In 1914 the United States estimate was 438,914, which was about 10,000 less than the estimate for San Francisco, but, according to an estimate issued by the national government July 1, 1916, Los Angeles had become a cosmopolitan city of 503,812 inhabitants, 40,296 larger than San Francisco.

Situation and Transportation. Los Angeles is in Southern California, fifteen miles directly east of the Pacific Ocean and ten miles south of the Sierra Madre Mountains. The course of the Los Angeles River is through the city, but the stream is dry the greater part of the year. The site of the city is generally level, interrupted by occasional steep hills; the suburban residence sections, however, extend into the foothills. A wide strip of land eighteen miles in length connects the main city with its harbor, which is on San Pedro Bay. By the annexation of the ports of Wilmington and San Pedro and other additions, the area has been increased from 106 square miles, as reported by the Federal census of 1910, to 287 square miles. Chinatown, and a Mexican community about the old Plaza Park, once the center of the town, are now in the north part of the city.

Los Angeles harbor has a possible water frontage of twenty-one miles. The Federal government has expended $3,100,000 upon the construction of a breakwater and in dredging operations, and in 1916 the city applied an additional sum of $10,000,000 to the greater development of the harbor, the building of municipal wharves and the construction of a broad transportation highway to the city. The Federal government is to construct an extensive system of fortifications on a bluff overlooking the harbor. With the completion of the Panama Canal, Los Angeles became a shipping point and port of call of first importance. Water commerce is rapidly increasing, and steamship lines operate from Los Angeles to San Francisco, Portland, Seattle and British Columbia, to Honolulu and the Orient, and through the Panama Canal to Atlantic and European ports.

The overland railroads running to Los Angeles are the Atchison, Topeka & Santa Fe; the Southern Pacific; the San Pedro, Los Angeles & Salt Lake, and the Chicago, Rock Island & Pacific. Perhaps no other American city has developed such an adequate system of street railways and electric interurban lines; the city lines comprise over 400 miles of single track; the interurban lines, double track, and many of them having four tracks, form a network throughout the country extending to places of interest and to numerous towns, some of them sixty miles distant.

Parks and Resorts. The entire Los Angeles County is really a great park, set between the Pacific and the snow-capped mountains, beautified by a semitropical vegetation, including orange groves, flowering shrubs and plants, pepper, palm, eucalyptus, acacia, banana and camphor trees. The city parks, with a combined area of over 4,000 acres, represent a combination of landscape gardening and this luxuriant natural vegetation. Near the business center, and bordered by a number of prominent buildings, is Central Park, one block square. Grif-

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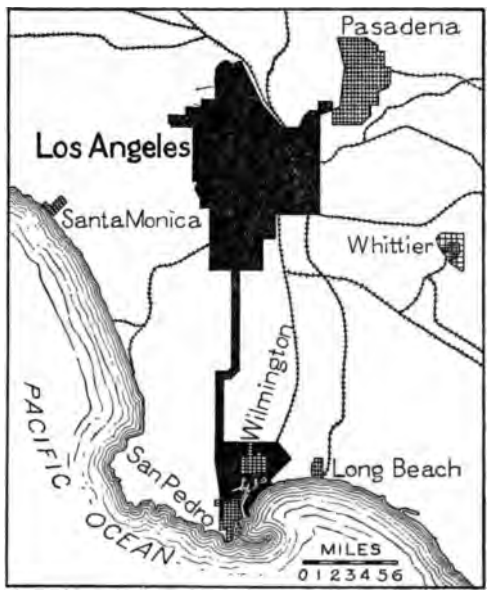
fith Park (3,015 acres), a wooded and hilly tract north of the city, is the second largest municipal park in the United States. The city has also Eastlake Park, near which is an alligator farm, aviary and aquarium, and Westlake, Echo, Elysian and Hollenbeck parks. Exposition Park contains a state exposition building; a museum of history, science and art, and the Seventh Regiment Armory, and, with its improvements, is valued at $3,000,000.

The automobile boulevards of the city extend throughout the county, becoming a part of the excellent system of state roads. Among the city's greatest attractions are the beach resorts, which include Santa Monica, Ocean



LOCATION MAP

Park, Venice, Redondo Beach, Long Beach and Catalina Island, and numerous suburbs, among them Hollywood, Alhambra, Pasadena and Universal City, the latter a municipality devoted to the moving-picture business (see MOVING PICTURE, subhead *Picture-Producing Plants*).

Buildings and Institutions. Los Angeles is preëminently a city of beautiful homes. Mission architecture, adapted from the Spanish, and the bungalow are characteristic types. The grounds surrounding private dwellings are exceptionally attractive. White is a prevailing color for private and public buildings, and retains its brightness because of the general absence of smoke in the city. Rows of potted palms are a unique feature of Broadway, one of the main business thoroughfares. Among the many prominent public buildings are t Federal building, erected at a cost of nea $2,250,000, the county courthouse and hall records, the city hall, the Bible Institu erected at a cost of $1,400,000, Y. M. C. A. a Y. W. C. A. buildings (the first said to be t finest of its kind in the world), the public brary, Temple Auditorium, Shrine Auditori and Blanchard Art building. The Old Pl Church, first built in 1822 and rebuilt in 18 was the headquarters of General Fremont a contains interesting relics of early days.

Los Angeles is the seat of the University Southern California (Methodist Episcopal), a of Occidental College (Presbyterian); it a has a state normal school, the McClay Coll of Theology, Saint Vincent's College (Cat lic), military academies, girls' schools and ma other private schools, art and music academ etc. There are more than forty hospitals an number of asylums.

Commerce and Industry. Los Angeles is market for one of the richest horticultural a agricultural districts in the United States, a the chief products exported are oranges, le ons, olives, walnuts, vegetables, grain and c ton. The deciduous fruits are also preserv canned or dried for export. Many acres a devoted to the cultivation of flowers, shr and bulbs for Northern and Eastern mark In 1913 the oil fields of California produc 97,788,525 barrels of petroleum; the rich fields are in Los Angeles and adjacent counti The manufacture of by-products, asphalt, lub cants, distillate and illuminating oil, is imp tant, and petroleum is used as fuel by the r roads and by manufacturers.

Los Angeles is the center and headquart for the rich mining fields of Southern Ca fornia, Lower California, Sonora, Mex., a Arizona, and a large territory in Southern Ut and Nevada. Mineral products include g and silver, borax, clay, gypsum, granite, cem and lime. Important industries are oil refini meat packing, and the manufacture of st and iron, mining machinery and supplies a lumber. Tuna fish is prepared by several ca neries at the harbor. The value of manuf tured products of Los Angeles for a sin year is estimated at $120,300,000. More th 15,000 people are engaged here in the prod tion of motion pictures and the annual outp is valued at $20,000,000.

The city is a port of entry; the annual val of imports from foreign countries averag $4,160,000, and the value of exports $2,900,9

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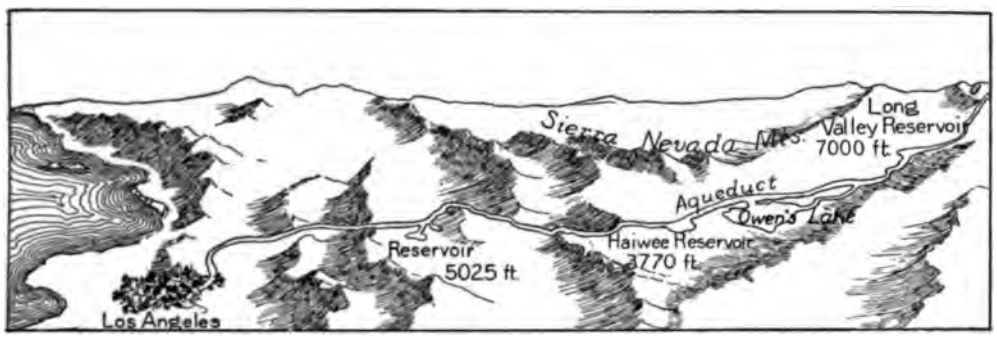
The value of lumber, the chief domestic import, is about $6,000,000. The leading exports are fruits and vegetables, wine and brandy, hides, wool, honey, canned goods, sugar, cotton, wheat, corn, petroleum and by-products.

History. A group of colonists from Mexico, under the command of a government official, made a settlement at Los Angeles in 1781 for the purpose of raising produce for the soldiers of the presidios. San Gabriel Mission, now surrounded by the town of Alhambra, had been founded a few miles east about ten years earlier. The little pueblo was named Pueblo de Nuestra Senora la Reina de Los Angeles (City of Our Lady, the Queen of the Angels), a title suggested by the church calendar. Until 1847, Monterey and Los Angeles were alternately the capital of the Mexican province of California. Los Angeles was taken by United States troops under General J. C. Fremont, in 1846, and was retaken by General Philip Kearny in 1847, after an uprising of the inhabitants. In 1851, the year after California entered the Union as a state, Los Angeles was chartered as a city; its rapid development began after the completion of the Santa Fe Railroad in 1885.

One of the most remarkable projects undertaken by the city, completed in 1913, was the building of the longest aqueduct in the world, which brings the melting snows of Mount Whitney to Los Angeles, a distance of over 250 miles. The total cost, including the preliminary work of constructing roads and trails, a telephone system, a broad-gauge railroad over the Mojave Desert, and power-generating plants, was about $25,000,000. The capacity is 258,000,000 gallons delivered at the outlet every twenty-four hours. The water power is used to generate electrical energy for manufacture, and the surplus water of the aqueduct is used for irrigation purposes at various points along the course.

LOSSING, *los'ing,* BENSON JOHN (1813-1891), an American who won fame as an historian, but who was first a watchmaker, editor and wood engraver. He was born in Bickman, Dutchess County, N. Y., was apprenticed to a watchmaker in Poughkeepsie in 1826, and in 1835 became editor of the Poughkeepsie *Telegraph.* Afterward he settled in New York as a wood engraver and illustrated his own writings. In 1841 appeared his *Outline History of the Fine Arts.* His *Pictorial Field Book of the Revolution* appeared in 1850 and 1852, being issued in numbers. He was also the author of a series of school histories. Other published works include *Life and Times of Philip Schuyler, The American Centenary, Compendious History of the Commonwealth of New York* and *Encyclopedia of United States History.*



MAP OF THE LOS ANGELES AQUEDUCT

LOTI, *lo te',* PIERRE (1850-), the pen name of LOUIS MARIE JULIEN VIAUD, a French novelist, whose early books, halfway between fact and fiction, portray not only his own life but also the spirit of modern literature in his own country. He was born at Rochefort of Huguenot ancestry, and at the age of seventeen entered the marine service. He traveled extensively until 1910, when he was placed on the reserve list, having been made captain four years before. As a naval officer he visited many ports, obtaining varied settings for his numerous books. The first of these, called *Aziyadé,* appeared in 1876, and told of his love for a beautiful slave girl in Constantinople. His most characteristic novel, *Mon frère Yves,* describing the life of a French bluejacket, won him great fame in 1883; his love of description rather than dialogue is best shown in his most popular novel, *Pecheur d'Islande,* which was written three years later and depicts the life of the Breton fishermen.

LOTTERY, *lot'er i,* a public gambling scheme for raising money by the distribution

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of prizes by lot or chance. In the commonest variety of lottery, numbered tickets are sold to the public, prizes being awarded to such as hold numbers corresponding to those on duplicate slips drawn from a wheel or other receptacle. Before the legitimacy of this form of raising money was seriously challenged, most modern countries resorted to its use to increase their revenues. In America, in the eighteenth century, it was used to raise funds for the erection of public buildings of all kinds, including even churches. Money was so raised for the restoration of the famed Faneuil Hall in Boston after its destruction by fire in 1761.

The latest lottery to flourish in America with government support was the Louisiana State Lottery, which by the terms of its charter yielded $40,000 annually to the state. In 1890 Congress withdrew from this corporation the use of the mails and forced its removal to Honduras. Four years later another act of Congress prohibited the importation of lottery tickets or advertisements and placed heavy penalties on the sale of lottery tickets. In Cuba, Mexico and other Spanish-American countries lotteries are yet conducted under state protection.

LO'TUS. Of the many different plants which bear the name of lotus, probably the most widely known is the Egyptian water lily, whose large white or rose-purple flowers and wide-spreading leaves are familiar sights along the margins of the Nile and neighboring streams. The blossoms, which are sometimes a foot in diameter, are borne on a weak stalk from four to eight feet in height, from which they rise only a little above the surface of the water. The sacred lotus of the Hindus and Chinese is also a member of the water lily family.

A closely-related American species, known variously as the *water chinquapin, lotus* and *yellow water lily,* is found in abundance only in five places in the United States. The largest bed, in Grass Lake, Northern Illinois, about fifty miles northwest of Chicago, is a compact mass of flowers covering about 600 acres, a wonderfully-impressive sight in August. There are other beds near New York City, at Monroe, Mich., and Southern California and near Beardstown, Ill., on the Illinois River; in the latter bed the flowers do not grow in a mass, but are spread out along the stream for several miles.

The name lotus is applied most properly to a member of the pea family, a native of the temperate regions of Africa and Asia. Th are about eighty species, and the flowers, wh resemble those of the pea in shape and s are white, yellow, red or purple. Import species are the bird's foot trefoil, the win pea and the coral gem, which grows in Canary Islands. The green pods of the win pea are sometimes eaten as a substitute green beans, and the ripened beans are usec a substitute for coffee.

The lotus is the national flower of the Hin and Egyptians. A particular species of

In that dark land of mystic dream
Where dark Osiris sprung,
It bloomed beside his sacred stream
While yet the world was young;
And every secret Nature told,
Of golden wisdom's power,
Is nestled still in every fold,
Within the lotus flower.
—WINTER: *A Lotus Flower.*

plant, no longer found growing in Egypt, w reproduced by the ancient Egyptians in th picture writing (see HIEROGLYPHICS) and works of art.

The Lotus-Eaters. In ancient Greek l ends, the lotus-eaters, or *lotophagi,* were a n of people who dwelt in Libya, on the north coast of Africa, and whose sole food was t fruit and blossoms of the lotus tree. Th plant, which has been identified as the *juju* tree, possessed the magical property of caus anyone who ate of it to forget his homela and the ties of friends and family. Tennys thus describes its effects in his poem, *T Lotus-Eaters:*

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Branches they bore of that enchanted stem,
Laden with flower and fruit, whereof they gave
To each, but whoso did receive of them,
And taste, to him the gushing of the wave
Far, far away did seem to mourn and rave
On alien shores; and if his fellow spake,
His voice was thin, as voices from the grave;
And deep asleep he seemed, yet all awake,
And music in his ears his beating heart did make.

In Homer's *Odyssey* it is told that Ulysses and his companions were entertained by the lotus-eaters on their return from the siege of Troy (which see). Three of the company partook of the "enchanted stem," and over them stole a languorous feeling, which made them desire to remain in that pleasant land and feast there forever. When Ulysses saw the dreamy, vacant expression in their eyes, he bore them forcibly away to his ships and forbade his other followers to taste of the magic food of that land "where it was always afternoon."

In modern speech the name lotus-eater is applied to the absent-minded, impractical person who aimlessly builds air castles and dreams dreams that can never come true.

LOUBET, *loo bay',* EMILE (1838-), a French statesman and former President of the republic, was born at Marsanne, in the department of the Drome. He studied law in Paris and practiced in Montelimar and in 1870 was chosen mayor of that city. In 1876 he was elected to the Chamber of Deputies and in 1885 to the Senate. He joined the Tirard Cabinet as minister of public works in 1887, and in 1892 became Premier. On the sudden death of President Faure in 1899 he was elected President of France on the first ballot. His patriotism and simplicity of manner made him a popular President, and under his administration the country prospered. His term expired in February, 1906, and he was succeeded by Fallières. See FRANCE, subtitle *History of France.*

LOUIS, *loo'is,* or *loo'i,* the name of a famous line of French kings. The reigns of the last three covered some of the most troubled periods of the history of the country. Those in whom interest largely centers are the following:

Louis IX [SAINT LOUIS] (1215-1270), the son of Louis VIII and Blanche of Castile. He was but twelve years of age when his father died and he succeeded to the throne, but his mother showed much wisdom and virtue as regent, and trained him to become a worthy king. Throughout his reign, indeed, he proved himself to be swayed by piety rather than by selfish ambitions.

In 1243 he was victorious in various engagements against the English, and in 1248 he set out in connection with one of the Crusades to the Holy Land, in pursuance of a vow made four years earlier during a critical illness. Failure attended his efforts, for he was captured by the Moslems and released with the remnant of his army only after the payment of a huge ransom. He remained for some time in Palestine, attempting to better the conditions of the Christians there, but in 1252 returned to France and devoted himself to the improvement of his country. He managed to increase the royal power at the expense of that of the great nobles, but at the same time was so just and kindly that he won the respect and love of all his vassals.

In 1270 he set out on a second crusade, but a plague broke out in the army while it was encamped in Tunis, and the king died. Twenty-seven years later he was canonized by Pope Boniface VIII. The Sieur de Joinville, who accompanied Louis on his expeditions, wrote a *History of Saint Louis,* which is the chief source of information as to the life of this monarch who was able and just in a day when ambition and intrigue betrayed the interests of most countries.

Louis XI (1423-1483), the son of Charles VII, and known as "the terrible king." Even before his father's death he had proved his vicious character, for he took part in various insurrections and was at length forced to flee from the kingdom. In 1461 he succeeded to the crown, and at once set himself to breaking down the power of the great nobles and strengthening his own. This he accomplished by the most high-handed means. If a noble opposed him he had him put to death, or thrown into a prison from which he never emerged. Indeed, it is said that the number of secret murders he had performed approached 4,000.

He acquired Provence, Maine and Anjou, and determined that the great possessions of the Duke of Burgundy must belong to the Crown. A long struggle with Charles the Bold was the result, and when Charles fell in battle Louis seized most of his territory and refused to surrender it to the rightful heirs. He was a pattern of the true despot, ruling without the States-General and levying taxes at his own discretion. Nevertheless, he benefited his country by his encouragement of art, learning and manufactures; established a postal system; opened roads and canals, and made it easier for the poorer classes to obtain justice. He was

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religious and superstitious, and utterly despised the trappings of royalty; but royalty in France owed perhaps as much to him as to any of its kings.

Louis XII (1462-1515), the son of Charles, Duke of Orleans. He headed insurrections against Charles VIII, and was defeated and thrown into prison, but was restored to the throne. His chief ambition was to gain possession of Milan, to which he laid claim by descent, and several times he led an army into Italy. For a time the French were victorious, but in 1512 they were defeated and driven out of Italy; and in the next year they were defeated by Henry VIII of England in the Battle of the Spurs. According to the treaty concluded in 1514, Louis took as his third wife Henry's sister, Mary, but he did not long survive his marriage.

France was prosperous under Louis, who, while he had no great virtues and little force of character, was gentle and kindly, and won from his subjects the title of "Father of His People." He left no male heirs and was succeeded by his son-in-law, Francis I.

Louis XIII (1601-1643), the son of Henry IV and Marie de Medici. He succeeded to the throne on the assassination of his father in 1610, but as he was a minor his mother acted as regent, and this position she retained until 1617. The young king was given practically no education, and when he came to the throne allowed himself to be dominated by one favorite after another. In 1624 Cardinal Richelieu entered the Council, and from that time on the reign was that of Richelieu rather than of the king. Louis might have thwarted his great minister many times, but he appreciated his genius and loyalty, and always gave him support.

The destruction of the political power of the Huguenots, the strengthening of the royal authority and the weakening of the influence of the Hapsburgs were the work of Richelieu and not of the king. By his wife, Anne of Austria, Louis had two sons, the elder of whom succeeded as Louis XIV, who became known to the world as the "Grand Monarch."

Louis XIV (1638-1715), called the GRAND MONARCH, and THE GREAT, was looked upon as the perfect type of an absolute monarch. His exclamation, *L'etat c'est moi* ("I am the state"), not only shows his character but accurately describes the conditions of affairs in France in his time. Louis was a monarch for seventy-two years, a longer time than any other ruler in the history of the world, although Victoria of England, who ruled sixty-four years, enjo longer responsible reign.

He was the son of Louis XIII and Anne Austria, and became king when but five ye of age. His mother and her great minis Mazarin, during the early years held the preme power, and exercised it in a way to m the administration very unpopular. The troul of the Fronde arose and were with difficulty down, and twice the court was obliged to from Paris. Little attention was paid to king's education and little was known about character, and thus it came as a surprise wl on the death of Mazarin in 1661 he decla that he would henceforth be his own chief m ister. He kept his word. Recognizing abi in others, he chose wise counselors, whose w in some instances, as that of Colbert with finances, was of the utmost importance; but matter how many brilliant men he gathe about him, Louis was always the dominat figure. He surrounded himself with all the g geous trappings of royalty, and his court rem famous as an example of all that is splen His wife, the Infanta Maria Theresa of Sp had little influence over him, but he was swa by a succession of mistresses until he came der the influence of Madame de Mainten whom he married secretly in 1685.

His Conquests. Louis's greatest ambition for foreign conquest, and his subjects, who d ing the early prosperous years of his reign garded as perfectly right anything which tl sovereign wished, entered enthusiastically i his plans. A valid reason for aggression never necessary to Louis—if he wished a tain territory he could always find basis fo claim to it. Attacks on the Spanish Neth lands began in 1667, and by the war with Sp which followed he gained French Fland Alliances of German states against France lowed, and these were constantly changing til at the outbreak of the War of the Spa Succession they took definite form as the lea under the leadership of William III of Engla which finally succeeded in defeating Louis's bitious plans.

Alienated Protestantism. The great mist which Louis made in the administration public affairs was his attitude toward the guenots, culminating in 1685 in the revocat of the Edict of Nantes. This was disastr for France, not only because it drove from country many of the most prosperous and dustrious citizens, but because it finally ali ated the Protestant countries of Europe, n

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bly England. Indeed, the latter years of Louis's reign were as unfortunate as the early period had been splendid. Colbert's reforms had been temporary only, and the country was plunged into debt, while the utter complaisance of the people toward their king had been destroyed. Louis's reign marks the height of French power and influence; in art, in literature, in war and in statesmanship, France stood supreme. After Louis's death the downfall was rapid.

Louis XV (1710-1774), the great-grandson of Louis XIV. He came to the throne when but five years of age. Philip, Duke of Orleans, a man of ability but of licentious life, acted as regent during his minority, and the court at which the young king grew up ruined a character which seemed to have elements of worth. His reign of almost sixty years was one of the greatest factors in bringing about the French Revolution.

In 1723 Louis was declared of age, and in the same year was married to Maria Leszczynska, daughter of the dethroned king of Poland. The Duke of Orleans died soon afterward, and after a brief period, during which the Duke of Bourbon was prime minister, Cardinal Fleury, Louis's tutor, was placed at the head of affairs. He did France one service in improving the financial condition, which had become most deplorable during the years of the regency, but he was too old to give France a commanding place in the politics of Europe.

When Fleury died in 1743 the king attempted to follow out the policy of his great predecessor and rule without a minister, but he lacked Louis XIV's force and ability, and his reign was a calamity to France. By the War of the Polish Succession, undertaken to replace the exiled king on the throne, France gained Lorraine, but that was the last achievement of the reign. The War of the Austrian Succession, in which France was the ally of Prussia, gained nothing, and the Seven Years' War, fought also in America under the name of the French and Indian War, upon which Louis entered as the ally of Austria and the enemy of England, cost France India and Canada.

These unsuccessful wars laid heavy debts upon the country, but the money spent for them was not so begrudged by the people as was that showered upon the king's mistresses. These women were the real rulers of the kingdom. For twenty years Madame de Pompadour dictated policies and appointed ministers, and she was succeeded by the equally famous Madame Du Barry. For his failure to achieve any results in war, for the scandals of his life, for all that he cost France, Louis XV, who at the beginning of his reign had won the title of "the well beloved," came to be detested. He realized the condition into which he was plunging the country, but in his cynical words, "After us, the deluge!" expressed his utter indifference and his willingness that his successor should pay the penalty. He was succeeded at his death by his grandson, Louis XVI.

Louis XVI (1754-1793), the grandson of Louis XV, whom he followed in 1774. He had been brought up at the court of his grandfather, but had avoided its viciousness and remained all his life a moral and religious man. His character, however, was far from kingly, for his one great passion was for hunting, and he was little interested in statesmanship or in public affairs.

Four years before his accession he was married to Marie Antoinette, daughter of Maria Theresa. While at first he cared little for her,

THE MOST FAMOUS OF THEIR LINE

she came in time to exercise a dominating influence over him, for Louis was weak, unable to deal with conditions in a troubled time, and the popularity which his good nature won for him at first speedily died.

The first question to be met was that of finance, and for the first two years of Louis's reign that was ably handled by Turgot. The privileged classes, the nobles and the higher clergy objected to Turgot's reforms as making

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demands on them, and in 1776 Turgot was replaced by the popular Jacques Necker. The aid given to the United States in the Revolutionary War laid a great burden of debt upon France, and Necker's methods in attempting to lift this angered the nobility, who demanded his resignation. In sanctioning this and in appointing to the vacant position the wasteful Calonne, Louis lost entirely the sympathy of his people, who began to demand far-reaching reforms. Necker was recalled in 1788, and suggested the convening of the States-General, which accordingly met in the following year. This event marked the opening of the French Revolution, and during the remaining years of his life Louis's history is a part of that movement. He pretended to sympathize with the revolutionists, but at the advice of his wife really opposed them, and as a result was taken prisoner with his family and brought from Versailles to Paris, where he was lodged in the Tuileries.

In 1791 the king and his family attempted to flee from France but were arrested and brought back. Although he promised to rule as a constitutional monarch the radicals were not satisfied, and a formidable invasion of the Tuileries took place in August, 1792. The king took refuge with the Assembly, and in the next month the Convention deposed him and declared France a republic. In December Louis was brought to trial for treason against the state, and though he defended himself with the greatest dignity was found guilty and on January 21, 1793, was guillotined.

Louis XVII (1785-1795) was king in name only. He was the son of Louis XVI and Marie Antoinette, both of whom died on the guillotine, and became Dauphin on the death of his elder brother in June, 1789. When his father and mother were made prisoners in the Temple in 1792 the little prince was confined with them, and the treatment shown him was harsher than that accorded others; for he was separated from his mother and given into the care of a cobbler named Sinim, who treated him with systematic cruelty.

On June 8, 1795, at the age of ten, he died, his death having been brought about by abuse and neglect; and at once there grew up a whole mythology of stories about him. Many people refused to believe that it was really the prince who had died, holding instead that he had been stolen out of the Temple and was in safekeeping somewhere. And in the years that followed numerous impostors arose claiming to be the lost prince. In all, there were no less than forty of these, though only two or three told stories which were not obviously absurd and untrue. A Prussian named Naundorff aroused the most interest, and there are those still who actually believe that he was the Dauphin. The latest pretender was Eleazer Williams, an Indian missionary born in the state of New York. He professed to have no memory of his early years, but brought forward claims which deceived many. Historians are, however, practically united in believing that the little prince did die in the Temple, or that if he was removed he died very soon afterward.

Louis XVIII (1755-1824), the "Restoration king of France," a brother of Louis XVI. He supported his brother in all his reactionary measures, showing no understanding of the real condition or necessities of his country. When Louis XVI attempted to escape in 1791 the Count of Provence, as his brother was called, fled with him and succeeded in getting across the frontier. The proclamations constantly issued from the court which he set up at Coblenz had the effect of enraging the people against Louis XVI and hastening his execution. On the death of Louis XVII the Count of Provence assumed the title of king, and during the Napoleonic period he traveled from country to country of Europe, finally settling in England.

In 1814, after the downfall of Napoleon, he ascended the throne, but showed himself far from liberal; and the enthusiastic reception which Napoleon met with on his return from Elba proved that the restored monarchy was not popular. He fled from Paris during the Hundred Days, but was again declared king after the Battle of Waterloo.

He lacked the insight or the force to take a positive stand in his policies, and succeeded in disgusting all parties in the state by his passive temperament. One thing, however, he had proved—that prosperity and content were not to be brought back to France by the restoration of the Bourbon monarchy. A.McC.

Consult Farmer's *Versailles and the Court under Louis XIV;* Haggard's *Louis XVI and Marie Antoinette;* Hall's *The Bourbon Restoration.*

Related Subjects. Further information as to the history of France during these reigns will be found in the following articles:

Bourbon	French and Indian Wars
Crusades	French Revolution
Dauphin	Fronde
Du Barry, Countess	Hapsburg, House of
France, subtitle *History*	

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Henry VIII (England)
Huguenots
Maintenon, Marquise de
Marie Antoinette
Mazarin, Jules
Medici
Nantes, Edict of
Necker, Jacques
Richelieu, Cardinal
Seven Years' War
States-General
Succession Wars

LOUIS I (778-840), called THE PIOUS, or LE DEBONNAIRE, was king of the Franks and Roman emperor, the third son of Charlemagne. His elder brothers died before his father, and he succeeded to the throne of the empire in 814, upon the latter's death. He was not without ability, but possessed none of the force which had characterized his father, and which was necessary in the government of so loosely organized a state. Trouble began in 817, when he divided his empire among his three sons, thus antagonizing his nephew Bernard, who felt himself entitled to Italy. In the insurrection which followed Louis captured Bernard and put him to death but suffered so from remorse that he entered a monastery for a time.

His first wife having died, he married in 819 Judith of Bavaria, who bore him a son, and by his desire to redistribute his possessions so as to provide for this fourth son he roused the jealousy of the other three, and the remainder of his reign was but a series of civil conflicts. Twice Louis was deposed and reinstated and he died before the struggle ended.

LOUISA, *loo e'za,* AUGUSTE WILHELMINE AMALIE (1776-1810), queen of Prussia, in whose honor the Prussian *Order of Louise* was founded, was born at Hanover. In 1793 she was married to the Crown Prince of Prussia, who afterwards ruled as Frederick William III. Her beauty, dignity and benevolence, together with the resolute and patriotic spirit she displayed during the wars with Napoleon, made her one of the most popular queens of history.

The story of the adoption of the cornflower, or *Kaiserblume,* as Germany's national flower, dates back to Queen Louise. This interesting story is told in these volumes under FLOWERS, subtitle *National Flowers.*

LOUISBURG, *loo'is burg,* a town on Cape Breton Island, Nova Scotia, once a great fortress, the chief stronghold of the French in America, now a fishing village of a thousand people. The town is on the Atlantic side of the island, about twenty-five miles southeast of Sydney, and though unattractive to settlers is admirably located as a fishing-station and as a fortress. Its splendid harbor, two and a half miles long and one and a half miles wide, is never ice-bound. After the French, by the Treaty of Utrecht in 1713, ceded Acadia to England, they still clung to Cape Breton Island. They hoped to keep it to guard the entrance to the Saint Lawrence River, and also to use it as a possible base of operations for the recovery of Acadia at some future time. On the rocky southeast shore they planted a great fortress, which they named Louisburg in honor of their king. For twenty-five years they labored over it, until it was considered impregnable. It became the resort of French privateers and fleets, and was a constant menace to the English colonies to the south.

First Siege of Louisburg. After the outbreak of King George's War, in 1744, the colony of Massachusetts equipped an expedition to attack Louisburg. The undertaking seemed little short of madness, for Louisburg was as strong as human ingenuity could make it. Nevertheless, a force of nearly 4,000 men, commanded by Colonel William Pepperell, set sail in a fleet of a hundred vessels, and was joined by ten English ships-of-war under the command of Commodore Peter Warren. The combined forces began the siege on April 30, 1745, and on June 17 the fortress surrendered. By the treaty of Aix-la-Chapelle in 1748 Louisburg was restored to the French.

Second Siege of Louisburg. For ten years the French held Louisburg unmolested. They rebuilt parts of the town destroyed in the siege of 1748, and greatly strengthened the fortifications. In 1758, however, in the third year of the French and Indian Wars (which see), it again fell to the English, in whose hands it remained. At the time it was garrisoned by 3,000 French soldiers, and in the harbor was a French fleet manned by as many sailors. There were only three possible landing-places for the attackers. The English, under the command of General Amherst (see AMHERST, JEFFREY), attacked all three places at once. The main attack was led by James Wolfe at Freshwater Cove, the position farthest from the town. Wolfe's men forced a landing, and the French, in danger of an attack in the rear, abandoned their positions and withdrew into the fortress. English batteries were set up back of the town and on the farther side of the harbor, and the French fleet was set afire by a bomb. Hopelessly surrounded, the French finally surrendered. See FRENCH AND INDIAN WARS.

LOUISE, *loo eez',* LAKE, called the "Pearl of the Canadian Rockies," is accounted the most exquisite small bit of scenery in the world. Lying at an altitude of 5,645 feet, in the romantic "Lakes in the Clouds" region, it mirrors

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in its pale blue waters all the changing, elusive colors of sky and clouds, dark forests and cliffs, and towering glacier-robed mountains. "A jewel dropped from heaven," one writer calls it, and another refers to it as "a liquid sapphire set in a diadem of silvered peaks." It is a quiet, tranquil lake, whose serenity is the more striking by contrast with the grandeur of the mountains, precipices and somber forests that encircle it. It is so shut in by mountains that winds do not ruffle its surface.

No spot of the Canadian Rockies is visited by more tourists than Lake Louise. It is in Alberta, thirty-four miles northwest of Banff and about two miles from the Canadian Pacific Railway station at Laggan, and is reached by a carriage road two and one-half miles long, and by an electric railway. On its shore the Canadian Pacific Railway has built a magnificent château hotel, and those who visit the lake may take advantage of a large number of mountain trips by pony or carriage.

LOUISIANA, *loo e ze an'a,* a south-central state of the American Union, with the Gulf of Mexico as its southern boundary. The name reminds one of the early history of the region, for it is named in honor of Louis XIV, king of France. The name of Louisiana was originally given to the whole Mississippi Valley by the French explorer La Salle, who in 1682 took possession of this vast region in the name of his king. Louisiana is the only state in the American Union where the French established a permanent settlement, and for this reason many of its institutions and laws are different from those of other states. As its flower Louisiana has chosen the magnolia, which truly represents the character of its luxuriant and fragrant vegetation. Popularly Louisiana is known as the CREOLE STATE, and it has also been given the nickname of the PELICAN STATE. A pelican appears on the state seal.

Size and Location. With an area of 48,506 square miles, of which 3,097 square miles are water, Louisiana ranks thirtieth among the states. New York, which is about 700 square miles larger, is the state nearest to it in size. Louisiana covers only about a fifteenth as large an area as the Canadian province of Quebec, which, like itself, contains a large population of French descent. The state is irregular in shape; its greatest length from north to south is 280 miles, and from east to west is 290 miles. It has a coast line of about 1,500 miles.

Its People. In population Louisiana, with 1,656,388 inhabitants in 1910, ranks twenty-fourth among the states. The estimated population on January 1, 1917, was 1,843,042. It had in 1910 an average of 36.5 persons to the square mile as compared with an average density of 30.9 for the whole of the United States. Of the population in 1910, 941,086, or 56.8 per cent, were white, and 713,874, or 43.1 per cent, were negroes, as against 52.9 per cent whites and 47.1 per cent negroes in 1900. The percentage of the negro population has been steadily decreasing. In the number of its negro inhabitants it ranks sixth among the states, South Carolina having a slightly larger number and North Carolina a smaller number than Louisiana.

A large proportion of the native white population is of French origin, being the descendants of the former French settlers of this region. Of the white population in 1910, 112,777 were of foreign or mixed parentage, and 51,782 were foreign born. During the last years there has been a strong immigration of Italians into Louisiana, and forty per cent of the foreign-born population of the state in 1910 came from Italy. Nearly 30 per cent of the people of the state live in cities and towns, and the urban population is larger here than in any other Southern state. This is due to the fact that New Orleans contains nearly one-fifth of the total population of Louisiana. Other principal cities are Baton Rouge, the capital; Shreveport, Lake Charles, Alexandria, Monroe, New Iberia, Crowley, Jennings, Opelousas, and Saint Martinville. The most important are described under their title in these volumes.

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Religion. In contrast to the other Southern states, where the population belongs largely to the Protestant churches, more than half of the people of Louisiana are Roman Catholics. The remainder belong mainly to the two dominant Protestant churches of the south, namely, the Baptists and the Methodists, in the order named.

Education. As in every state with a scattered rural population and a great number of negroes, there were until recently an insufficient number of schools, but these are increasing steadily, and their standard is rising. The education law voted in 1912 introduced many reforms. It gave wide powers to the state board of education, composed of the governor, the superintendent of public education, the attorney-general, and one citizen from each of the eight congressional districts, appointed by the governor for four years. The schools in each parish (a *parish* in Louisiana is the same as a *county* in other states) are under the direct administration of a parish school board composed of from five to ten members, elected for six years. The board appoints the parish superintendent, who must be a competent teacher. The state now possesses quite a number of high schools. Separate schools are provided for white and negro children.

At the head of the educational institutions stands the State University and Agricultural and Mechanical College, situated at Baton Rouge. Then follow Tulane University at New Orleans; Loyola University at New Orleans; the Industrial Institute at Ruston; the Southwestern Industrial Institute at Lafayette; and two normal schools for the training of teachers, one at New Orleans, and the other at Natchitoches. Among the institutions for the education of negroes are the Southern University, Straight University and Leland University, all three situated at New Orleans; Southern University and Agricultural and Mechanical College at Baton Rouge; and the Louisiana Academic and Industrial Institute at Alexandria. Some of these are maintained by various religious denominations.

Louisiana has the largest proportion of illiterates of any of the states of the Union. In 1910 there were 352,179 persons who could not read or write, representing 29 per cent of the population of ten years or over, as compared with 38.5 per cent in 1900. The percentage of illiteracy was 48.4 per cent among negroes, 24 per cent among foreign-born whites and 13.4 per cent among native whites. With a decrease in the proportion of negroes and better educational facilities, there is due very soon a vast improvement.

Charitable and Penal Institutions. The state maintains an institute for deaf and dumb, and another for blind children, both at Baton Rouge; insane asylums at Jackson and Pineville; a soldiers' home at New Orleans, and several hospitals. The state penitentiary is at Baton Rouge, and there is a house of detention at New Orleans. A reform school for juvenile offenders is situated at Monroe, and an industrial school and home for colored children is at New Orleans. At Angola, Hope and other places there are prison farms, where convicts are employed in agricultural work.

Physical Features. Louisiana is one of the lowest and most level states in the Union, its average elevation being only about seventy-five feet above the level of the sea. The surface slopes gradually from near the northern border, at Arcadia, where it reaches an altitude of 368 feet, to the sea. The southern portion is a coastal plain, extending inland for thirty to sixty miles, and is largely made up of marshlands, cut up by lakes and lagoons. In this coast region one often meets the so-called "trembling prairies," that is, land that trembles when men or cattle pass over it. These plains are formed of vegetable mold, which rests on water, peat or quicksands. To the north of this region is a broad prairie belt extending into Texas and bordered on the north by rolling forest lands. The land along the Mississippi and the other rivers consists of flat plains, that are usually situated below the level of high-water mark of the rivers, and are therefore exposed to floods. These flood plains, which extend in width from six to sixty miles, contain a soil of great fertility and are mostly occupied by large plantations of sugar cane, cotton and corn. They are protected against overflow of the rivers by artificial banks, or *levees*, of which there are now about 1,500 miles in Louisiana. The system of levees, which has been of such enormous benefit to the state, has been built almost entirely since the War of Secession, and represents an expenditure of nearly $50,000,000 for the original cost of construction alone.

Rivers. Louisiana has nearly 4,000 miles of navigable rivers. The chief river is, of course, the Mississippi, which flows through about one-half of the state, and borders the other half. The Red River crosses the state from the northwest and joins the Mississippi; while the Washita enters near the northeastern corner

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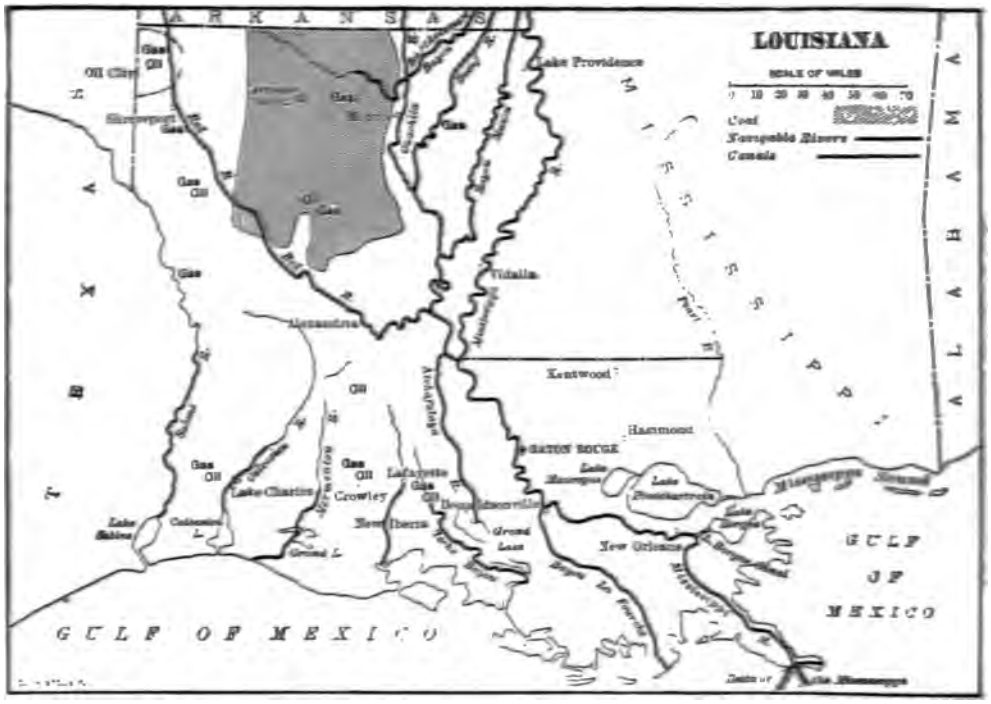

OUTLINE MAP OF LOUISIANA

Showing the boundaries of the state, extent of navigable rivers, chief cities, location of gas fields and coal areas, and the highest point of land in the state.

and flows southward to near the middle of the state before joining the Red River. The Sabine River divides Louisiana from Texas, and forms two-thirds of its western boundary, while the Pearl forms a part of its eastern boundary and divides Louisiana from Mississippi. The southern part of the state is traversed by numerous bayous, which are really secondary rivers, or flood outlets.

Louisiana contains many lakes. Those in the gulf plain on the south are but shallow arms of the sea, and their water is salt or brackish. Along the rivers there are numerous lakes, which are really lagoons that were formerly in river channels but have been cut off by changes in the course of the river. Such lakes are usually in the form of arcs of a circle, and are connected with streams.

Climate. Louisiana has a semitropical climate, but owing to the nearness of the Gulf and the winds that blow from that direction, the intense heat is tempered, and the climate is equable. The average temperature for January is about 60° F. in the southern part of the state, and 45° F. in the north, while in summer the thermometer may rise as high as 100° F. Frosts occur from the first of November until the first of March, but the temperature seldom reaches the zero point. The entire state has an abundance of rainfall, which is evenly distributed throughout the year, and averages sixty inches in the southern half and fifty inches in the north.

These climatic conditions favor a luxuriant vegetation, in which most of the warm temperate and many of the subtropical species grow. Of native flowers the commonest and best known are roses, water lilies, magnolias, hyacinths, camelias, oleanders and chrysanthemums.

Forests. Some of the finest and greatest forests in the United States are found in Louisiana. It is estimated that about 28,000 square miles, or over half of the total land area, are covered with forests. In this respect Louisiana is surpassed only by Idaho and the Pacific Coast states. Pines, both the long-leaved and short-leaved varieties, cover nearly forty per cent of the area under forests. In the southwest there is an extensive pine belt, of about 4,200 square miles, which contains the heaviest growth of long-leaved timber in the world. Since 1904 Louisiana has occupied first rank among the states in the yellow pine industry.

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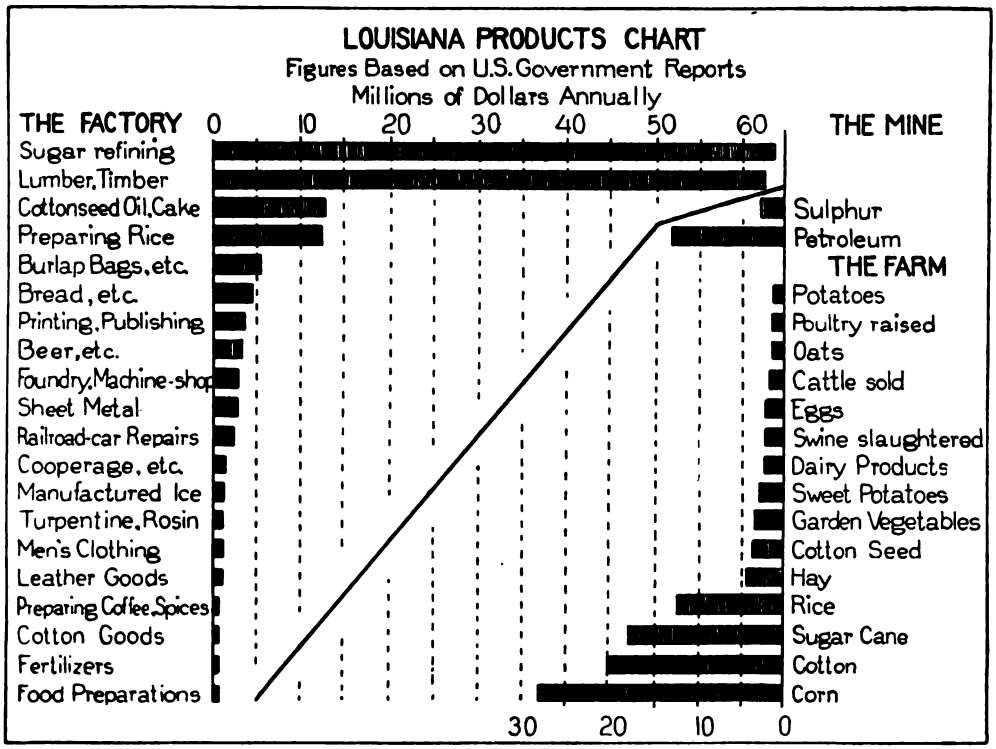

The swamp regions contain extensive and magnificent forests of cypress. Hardwood timber, represented by oak, cottonwood, red gum, magnolia, ash and hickory, is found throughout the state. As regards lumber products Louisiana now ranks second, being surpassed only by the state of Washington.

Agriculture. As this region has a fertile soil, a semitropical climate, and an abundant and well-distributed rainfall, it is only natural that agriculture should be the chief occupation of the people of the state. About one-third of the total land surface, approximating 29,061,000 acres, is included in farms, the average size of these being eighty-six and one-half acres. The average value of farm land per acre is $18, land in Louisiana having a slightly higher value than that in any other of the Gulf states.

Louisiana leads all the states of the Union in the production of rice and sugar cane, but corn and cotton are of equal or greater value to the state, and occupy a larger acreage. Rice has been grown here for many years, but its production has increased enormously since 1880, when new methods of cultivation were introduced. Nearly fifty per cent of the total production of rice in the United States is grown in Louisiana, and from twenty-five to forty per cent in the neighboring state of Texas. The entire region west of the Mississippi and bordering on the Gulf of Mexico, the center of which is Crowley, in Acadia parish, is now one extensive rice field. About 400,000 acres are under rice, and the yearly production averages more than 10,000,000 bushels. See the article RICE, for map of rice production in America.

Louisiana produces over seventy-five per cent of the sugar cane raised in the United States. The region situated around the lower part of the Mississippi, and generally known under the name of the "sugar bowl," is devoted to the cultivation of cane. The sugar plantations cover an area of over 500,000 acres, and the yearly production of cane is about 5,000,000 tons.

The cotton plantations cover over 1,000,000 acres, and Louisiana, with a yearly production of 400,000 bales, is usually ninth among the cotton-producing states, ranking after Oklahoma. The area planted to corn is steadily increasing, covering now over 2,000,000 acres; the yearly yield is about 40,000,000 bushels. Other important crops are oats, sweet potatoes, garden vegetables, hay and forage plants.

Many of the fruits of warm and semitropical lands, such as oranges, grown especially on the

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coast, figs, grapefruits, peaches and pomegranates are produced here.

Animal Life. Among the wild animals native to the Gulf states black bears, wolves and deer are still found occasionally in Louisiana, and the lynx and panther may be seen on rare occasions in the swamp regions. Raccoons, squirrels and opossums are common, and the bird life is varied and abundant. Besides the familiar game birds, such as pelicans, cranes, turkeys, geese and partridges, there are many smaller feathered residents, some of which are clothed in charming and brilliant plumage. Alligators and numerous kinds of reptiles, including turtles, lizards, rattlesnakes and moccasins, are found in the swamp lands.

Live stock is made up chiefly of cattle, horses, mules, sheep and swine; the state has about 268,000 milch cows, 191,000 horses, 132,000 mules, 180,000 sheep, 1,412,000 swine. Louisiana produces each year about 32,702,130 gallons of milk, and the total annual value of its dairy products is nearly $3,000,000.

Fisheries. In the value of its fisheries Louisiana is second only to Florida among the Gulf states. The oyster fisheries are the most important, and are surpassed only by those in Chesapeake Bay. Other important catches are shrimp, catfish, trout and crabs. Alligators, caught for their hides, were formerly numerous, but are becoming scarce.

Minerals. The mineral resources of Louisiana have been worked only since the first decade of the twentieth century. Its chief products are sulphur, petroleum, salt, coal and natural gas. Louisiana produces nearly all the sulphur extracted in the United States, and one of the most important sulphur mines in the world is found at Sulphur City. The only other great source of supply in the world is the sulphur mines in Sicily (Italy). At Sulphur City large beds of sulphur that extend four to six hundred feet underground are found. A new and interesting method is used to extract the sulphur from these underground beds. Hot water is pumped down into these sulphur beds; this dissolves the sulphur. Then the water is brought up in pipes to the surface, where it is cooled in large tanks. The sulphur it contains in solution is thus deposited, leaving a product of remarkable purity. The value of the sulphur extracted yearly is nearly $6,000,000. The most valuable mineral product of the state is petroleum, and the oil fields here are a continuation of those in Texas. One of the richest oil regions in the United States is found around Jennings. Extensive oil fields are located in Caddo parish, in the north. In 1914 Louisiana produced over 14,000,000 barrels of petroleum. Natural gas has also been found in Caddo parish, and it is believed that this state is underlain by one of the greatest gas fields found in any part of the United States.

Rock salt is another mineral largely extracted here. Deposits of salt were first discovered at Petite Anse Island, in the coast swamp region, during the War of Secession, and these have been worked ever since. In some places this deposit is over 1,000 feet thick, and the salt is of remarkable purity.

Manufactures. The manufacturing industries of Louisiana have shown a steady and rapid growth. The value of the state's manufactured products in 1880 was only $24,205,000; since then it has increased tenfold, to over $250,000,000 yearly. Between 1899 and 1909 it doubled, and in the next five years increased a further fourteen per cent. This great development has been due to the discovery of the oil fields in Texas and in the state itself, which is supplying for its factories a cheap and handy fuel. The improvement of waterways and the building of railroads have also greatly helped this remarkable industrial activity. As is only natural, the products of its extensive cane sugar, rice and cotton fields and the timber of its primeval forests provide the raw material for the chief industries of the state.

The most important industry is the manufacture and refining of cane sugar and the manufacture of molasses. Louisiana ranks first among the states of the Union in this respect. The manufacture of cane sugar in the United States is confined almost exclusively to Louisiana, while it produces double the amount of molasses manufactured in all the other states. Next in importance comes the manufacture of lumber and timber products, over 700 establishments being engaged in this industry. The manufacture of cottonseed oil and cake comes next. This is followed by the cleaning and polishing of rice, Louisiana containing more than half of all the establishments in the United States engaged in this industry. The manufacture of bags, mostly from burlap, for handling cottonseed and rice, is also well developed.

Transportation. The navigable rivers make it possible for almost any part of the state to be reached by water, affording comparatively easy and cheap transportation. Railroad construction was begun late, and has been rather slow. The state had 5,225 miles of railroad,

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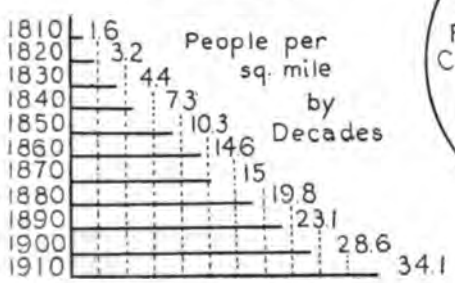
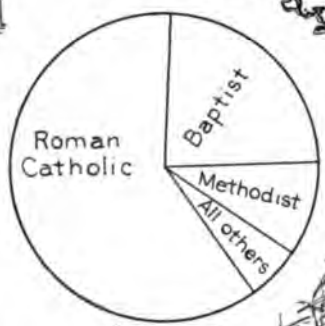
LOUISIANA

Jackson Monument
New Orleans





Religions

Sugar cane

Center of rice
production
in U.S.

Confederate Monument
New Orleans

Cabildo, Old Spanish Court, New Orleans

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main lines and branches, in 1915. Several trunk lines traverse Louisiana from north to south and from east to west. The principal lines are the Southern Pacific; Texas & Pacific; Louisiana Railway & Navigation Company; Kansas City Southern; Illinois Central and Yazoo & Mississippi Valley; Chicago, Rock Island & Pacific, and Queen & Crescent Route. The great railroad center is New Orleans, which is also the chief river port and seaport. In the total tonnage and value of merchandise New Orleans is now the second port in the United States, coming after New York. A canal has been built from the Mississippi River to Lake Borgne, which greatly shortens the passage from New Orleans to the Gulf of Mexico. Louisiana has a railway commission of three members, who have control over and authority to fix rates on both rail and water routes. The state is divided into three railway commission districts, and each district elects one commissioner.

Government. Louisiana is governed under a constitution adopted in 1913. This is the ninth constitution the state has had since its admission to the Union in 1812. It has many political institutions and provisions that differ from those of other states. This is due partly to the attempt to harmonize its former laws and institutions with those of the American democracy, and partly to the problems connected with the possession of a large negro population.

The *executive* officials, the governor, lieutenant-governor, secretary of state, state treasurer, state auditor and attorney-general, are elected for four years each. All except the governor and state treasurer may be reëlected. The governor must be at least thirty years of age at the time of his election.

The *legislative* power is vested in a general assembly, which consists of a senate and a house of representatives. The number of senators must not exceed forty-one or be less than thirty-six, and the house of representatives must not have more than 120 members. The members of each branch are elected for four years. Sessions of the general assembly are held every two years, starting the second Monday in May in even numbered years, and are limited to sixty days.

Louisiana sends eight members to the United States House of Representatives.

At the head of the judicial power is the supreme court, consisting of one chief justice and four associate justices, each elected for twelve years. Below this there are twenty-two district courts, each with one judge elected by the people for a term of four years. There are, besides, courts of appeal, justices of the peace, and such other courts as may be created by law. The constitution of 1913 created a juvenile court at New Orleans and made provisions for the establishment of other such courts throughout the state.

For purposes of local government the state is divided into "parishes," which have here exactly the same meaning and function as counties in other states. This division into parishes dates from 1807, and is based on an earlier Spanish division of the province, made for religious purposes. This explains why so many parishes are named after saints. The general assembly has the power to establish new parishes, but no parish can have a smaller area than 625 square miles, nor contain fewer than 7,000 inhabitants.

Towns with more than 2,500 and cities with more than 5,000 inhabitants may adopt the commission form of government.

Suffrage. The conditions under which the franchise is granted in Louisiana differ from those prevailing in other states, and are of special interest. Every male citizen of the United States, twenty-one years of age or over, who has been an actual resident of the state for two years, of the parish for one year, and of the precinct in which he offers to vote for six months immediately preceding the election, is entitled to vote, if he satisfies certain other conditions. He must first show his ability to read and write either English or his mother tongue by filling out a form applying to be registered as a voter. This is known as the literacy test. In case he is not able to read and write he must show that he owns property of at least $300 in value.

The constitution also provides that no person under sixty years of age shall be permitted to vote unless he has paid a yearly poll tax of one dollar for the two years preceding the election in which he offers to vote. These provisions have been introduced in order to reduce as much as possible the number of negro voters, and they have proved quite successful, as very few negroes meet the required qualifications.

Law. The law system of Louisiana occupies a unique position, for it is the only one among the states of the Union that is not based on the English common law. When the province came into the possession of the United States in 1803, the Spanish laws were in force. But the majority of the people were of French descent and had strong French traditions, so when the famous Code Napoleon was introduced in France

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RESEARCH QUESTIONS ON LOUISIANA

(An Outline suitable for Louisiana will be found with the article "State.")

Has the state which is nearest Louisiana in size a larger or a smaller population? How much?

What is the purpose of Louisiana's levees? What was the cost of their construction?

How does Louisiana rank among the states in the production of cotton? About how many bales does an acre yield?

What is the chief port of the state? How does this city rank among the ports of the United States as regards value of merchandise entering and clearing?

What is the significance of the state name? Give two popular names. What is the state flower?

What are "trembling prairies," and where are they to be found? What is the highest point in the state?

Is this higher or lower than the highest point in Illinois? In Florida?

Of what two very important substances does Louisiana produce larger crops than any other state in the Union?

Of what manufactured products does this state make more than half of all that is produced in the United States?

Has Louisiana more or fewer inhabitants to the square mile than the country as a whole? If the province of Alberta were as thickly settled, what would its population be?

What are *bayous?* Where do they occur in this state?

What part of the state is known as the "sugar bowl," and why is it so called?

To what division of other states does the parish of this state correspond? Why are so many of the parishes named after saints?

How does it happen that there is a larger city population in Louisiana than in any other Southern state?

How were the lakes in the southern or coastal plain region formed? How were the lakes along the rivers formed?

How many of the Gulf states surpass Louisiana in annual value of fisheries? What is the most important of the sea foods?

If an inhabitant of Louisiana cannot write enough to fill out his registration blank, what chance is there that he may vote?

How does the religious situation differ in this state from that in other Southern states?

In what important mineral product does Louisiana surpass all the other states of the Union combined? Where else is this same substance mined?

How is hot water used in mining in this state?

How does the civil law code in Louisiana differ from the codes of the other states? How do you account for this?

Why has the educational problem been a peculiarly difficult one? What steps have been taken toward solving it?

How many states produce more lumber than does Louisiana? What is its most valuable timber tree?

What substance that appears on your table at every meal is mined in this state in great quantities?

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many of its provisions were incorporated into the laws of Louisiana (see CODE NAPOLEON). The United States government did not interfere, for it has always been its policy to leave to the people the task of making or changing their laws, as long as these do not conflict with the Federal Constitution or with the fundamental legal customs of the country. This explains why to-day the laws of Louisiana contain elements of both Roman and English law. Its civil law is almost entirely based on the French system, and is different from that in use in the other states, while its criminal, commercial and corporation laws are based on the English system.

Other Constitutional Provisions. Louisiana possesses a conservation commission that is charged with protecting the natural resources of the state. It adopted in 1906 a primary election law for the direct nomination of all state, parochial and municipal officers. An employers' liability law providing for the compulsory compensation of workmen in case of accidents was voted in 1914. Several acts dealing with the liquor traffic have been passed. It is an offense to sell or give away cocaine. Gambling on horse racing is prohibited. A period of ten hours constitutes a legal day's work. It is unlawful to employ children under fourteen years of age, while night work for boys under sixteen and girls under eighteen is also forbidden.

History. Louisiana is one of the regions of the United States that was visited quite early by explorers. In 1519 Alvarez de Pineda, a Spanish explorer, entered the mouth of the Mississippi and spent some time on its banks, and in 1541 the region was visited by De Soto. In 1682, La Salle descended the Mississippi River to its mouth, took possession of the entire country, and named it Louisiana, in honor of his king, Louis XIV of France. The first permanent settlement was made in 1699 by d'Iberville at Biloxi. In 1718 the Company of the West, organized by John Law, obtained the exclusive privilege of trade in Louisiana. New Orleans, which had been founded in the same year by Bienville, the governor of the colony, was made the capital in 1722. In 1733 the province came under the direct administration of the Crown. By the treaty of Paris, concluded in 1763, France ceded to Spain all that portion that lay west of the Mississippi, together with the city of New Orleans and the island on which it stood. By the same treaty it ceded to Great Britain all the rest of its possessions in America. The people of the province were not satisfied with this change, but eventually Spain established its rule. In 1800 Napoleon obtained back from Spain the ceded territory, and in 1803 he sold the province to the United States for $15,000,000 (see LOUISIANA PURCHASE). In 1804 the region west of the Mississippi was organized as the Territory of Orleans.

Progress as a State. In 1812, April 30, the Territory of Orleans, increased by the region east of the Mississippi and comprising the present area was admitted as the fifth new state of the Union after the original thirteen, under the name of Louisiana. In the War of 1812 New Orleans was attacked by the English and was bravely defended by about 5,000 men under General Andrew Jackson. In 1852 the capital was moved from New Orleans to Baton Rouge.

Louisiana passed the ordinance of secession on December 23, 1860, and in 1861 it ratified the Confederate Constitution. New Orleans was occupied by Union forces in May, 1862, and a military government was established. The state suffered severely from the cessation of its commerce. During the period of reconstruction Louisiana was the scene of long-continued strife, and bloodshed was frequent. Military occupation came to an end in 1868, after Louisiana had adopted a constitution enfranchising the negroes, and after it had ratified the Fourteenth Amendment to the Federal Constitution. The great mass of the white population was slow to reconcile itself to the new conditions.

By what was known as the "grandfather clause" in the constitution of 1898, and by the conditions required to exercise the privilege of voting laid down in the constitution of 1913, which are described above (see SUFFRAGE), the political predominance of the whites has been assured.

In 1884 the New Orleans Exposition was held to celebrate the hundredth anniversary of the first shipment of cotton from New Orleans. Since the beginning of the twentieth century the progress of the state in material wealth, educational conditions, and social legislation has been steady and rapid. O.B.

Consult Thompson's *The Story of Louisiana;* Cox's *Explorations of Louisiana;* Phelps' *Louisiana*, in American Commonwealths' Series.

Related Subjects. The following articles in these volumes will be of interest in connection with a study of Louisiana:

CITIES

Alexandria	Monroe
Baton Rouge	New Orleans
Lake Charles	Shreveport

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HISTORY

De Soto, Fernando	La Salle, Sieur de
Grandfather's Clause	Louisiana Purchase
Iberville, Sieur d'	Reconstruction

PRODUCTS AND INDUSTRIES

Cotton	Pine
Forests and Forestry	Rice
Lumber	Sugar
Molasses	Sugar Cane
Oyster	Sulphur
Petroleum	

RIVERS

Mississippi	Sabine
Red	Washita

UNCLASSIFIED

Creole	Levee

LOUISIANA PURCHASE, the most important event of Thomas Jefferson's administration, by which the United States secured a vast region lying between the Mississippi River and the Rocky Mountains, and extending from the

LOUISIANA PURCHASE
An area over half as large as that part of Europe west of Russia. It cost the United States less than fifteen dollars per square mile.

Gulf of Mexico to the Canadian boundary. Out of this domain have been formed fourteen states, in whole or in part. In 1802 the government discovered that two years before Spain had been forced by Napoleon to cede to France the territory known as the province of Louisiana, the heart of the North American Continent. The news was disquieting, for France was a powerful nation, and the mouth of the Mississippi was a strategic point. To close the mouth of this river to United States trade meant to ruin the commerce of the western states bordering on the great river. When Jefferson heard of the acquisition of the province by France he wrote Robert R. Livingston, minister at Paris, to ask for New Orleans and the Floridas, or at least for the right of deposit (storage for American imports and exports) at New Orleans. If the request were refused, Jefferson, although a lover of peace, stood ready to declare openly against France, holding that the despotic control of the Mississippi was an act of deliberate unfriendliness. In such a case, the United States would at that time have become the ally of Great Britain in its war with France.

Napoleon was forced to recognize Great Britain's supremacy on the sea, and he felt the impossibility of holding the port of New Orleans against British attack. For this reason, more than for any friendliness toward the United States, Napoleon offered Livingston, not the Floridas or the minor right he had demanded, but the entire Louisiana province, a section of land which covered 1,172,000 square miles. At this point, James Monroe, sent by Jefferson as minister plenipotentiary in the crisis, closed the deal unhesitatingly. The land cost the United States $15,000,000. The transfer was made on April 30, 1803.

The act did not win Jefferson's unqualified approval. He held that there was nothing in the Constitution which provided for the acquisition of the land and advised a constitutional amendment, but the people overwhelmingly approved of the purchase, and the vote of the Senate stood twenty-four to seven in favor of it, so the province of Louisiana was annexed to the United States. The inhabitants of that territory came under United States protection, and special privileges of entry, to hold good for twelve years, were granted France and Spain.

Louisiana Purchase Exposition, an international fair held in Saint Louis, Mo., to celebrate the one-hundredth anniversary of the purchase of the Louisiana territory from France. It opened April 30, 1904, and continued until December. It was one of the greatest exhibitions the world had ever seen; forty-two states and fifty-three countries were represented. Fifteen buildings, in Renaissance architecture, were grouped in the form of a fan on a site in Forest Park. Four art buildings were the point of the fan. There were palaces of Education and Social Economics, of Mines and Metallurgy, of Liberal Arts, of Manufacture, of Varied Industries, of Electricity, of Machinery and of Transportation. The largest building was the Palace of Agriculture, which covered twenty-three of the 1,142 acres given to the site. There were also 500 buildings representing governments, states and special exhibits. France erected a copy of its Grand Trianon (the home of Marie Antoinette) of Versailles, and Louisiana's build-

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ing was a reproduction of the New Orleans Cabildo, where the transfer of the Louisiana territory took place. Before the exhibition was opened to the public more than $20,000,000 had been spent. Total attendance was 21,000,000.

Consult Hitchcock's *The Louisiana Purchase and Exploration;* Hosmer's *History of the Louisiana Purchase.*

LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE, a state school whose history begins with government land grants made early in the nineteenth century. The university is the outgrowth of the Louisiana State Seminary and Military Academy, which was founded in 1853 near Alexandria, and opened in 1860 under the presidency of William T. Sherman, a prominent officer in the Union Army during the War of Secession. In 1869 the seminary was removed to Baton Rouge, where, in 1870, it became the Louisiana State University. In 1873 the Agricultural and Mechanical College at New Orleans was founded. In 1877 this school and the older one at Baton Rouge were merged into one institution, which was chartered under the present name. The university is organized into colleges of arts and sciences, agriculture and engineering, the teachers' college, the law school, Audubon Sugar School and a graduate department. At New Orleans, Crowley, Calhoun and Baton Rouge are agricultural experiment stations connected with the university. Tuition is free except to students of foreign countries, who pay a fee of $100. Many such students attend the university for the experimental courses offered in the Audubon Sugar School. The library contains over 37,000 volumes. There are ninety-eight instructors and student assistants, forty-two officers and experiment station and extension workers not included in the faculty, and over 1,650 students.

The Audubon Sugar School is the only school of its kind in the United States, and is believed to be unsurpassed in the world for training sugar chemists, sugar engineers and factory superintendents. The law school devotes more attention than usual to the civil law upon which is based the jurisprudence of Louisiana and the Latin-American countries. The university has for some years engaged extensively in activities outside of its walls, on the theory that a state university should, to some extent at least, serve all the people of the state instead of confining its efforts to those only who can attend its classes. For instance, the college of agriculture was one of the pioneers in organizing clubs of various kinds among the rural population; and the department of junior agricultural extension was the first to plan, construct and operate a combination of the automobile and the moving picture machine, by which moving pictures and lantern slides illustrating the work of the department have been exhibited in the most remote country districts T.D.B.

LOUIS PHILIPPE, *loo e' fe leep'* (1773-1850), king of the French, called THE CITIZEN KING, was born in the Palais Royal, Paris, and was the eldest son of Philippe Egalité, duke of Orleans. Favoring democratic principles at the outbreak of the French Revolution, he entered the national guard, rose to the rank of lieutenant-general and took part in the battles of Valmy, Jemappes and Neerwinden. He then became involved in the conspiracy of his chief, Dumouriez, against the republic, and was arrested, but escaped to Switzerland. In 1814 he returned to France and recovered his vast estates, which had been seized by the Imperial government. When the Revolution of 1830 ended with the abdication of Charles X, Louis Philippe was made lieutenant-general of the kingdom, and a week later was appointed to the vacant throne. During the eighteen years of his reign he was universally unpopular and in the Revolution of 1848 was forced to abdicate. He fled to Normandy and then to England, where he spent the few remaining years of his life.

LOUIS THE GERMAN (about 805-876), king of the Eastern Franks from 843 to 876, whose share of the empire of his father, Louis the Pious, formed the nucleus of modern Germany. Louis the Pious, son of Charlemagne (which see), had inherited the great empire of his father. Upon the death of Louis, in 840, a fierce dispute broke out among his three sons, Louis, Charles the Bald, and Lothair, each of whom was a claimant for the domains of his father. In 843, by the Treaty of Verdun, the empire was divided into three parts, Louis the German receiving the portion east of the Rhine (see VERDUN, TREATY OF). He thus became ruler of the German, or East Frankish, kingdom. During much of his reign he was engaged in warfare, as he was forced to defend his realm against the invasions of the Slavs and the Northmen, and to crush the revolts of his sons. In 870 he forced his brother, Charles the Bald, to sign the Treaty of Mersen, whereby the territories of Lothair were divided between the West and East Frankish kingdoms. His reign was much troubled by revolts of his sons.

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LOUISVILLE, *loo'is vil*, Ky., the largest city of the state, and the county seat of Jefferson County. The population, which in 1910 was 223,928, had increased by 1916 to 238,910. The city is on the Ohio River, the north state boundary line; and is 130 miles by the river and 110 miles by rail southwest of Cincinnati. Frankfort, the state capital, is fifty miles east.

Louisville is served by the Baltimore & Ohio Southwestern; Chesapeake & Ohio; Chicago, Indianapolis & Louisville; Cleveland, Cincinnati & Saint Louis; Illinois Central; Louisville & Nashville; Louisville & Northern; Louisville, Henderson & Saint Louis; Pittsburgh, Cincinnati, Chicago & Saint Louis, and the Southern railroads. Electric interurban lines extend to neighboring cities and towns. Steamers from Louisville navigate more than thirty rivers, tributaries of the Ohio and the Mississippi, and connect with Memphis, Cairo, Cincinnati and many other river ports.

The city has an area of twenty-four square miles. It extends seven miles along the south shore of the river and is about sixty feet above low water, sufficiently high to be free from flood dangers. The falls by which the river descends twenty-six feet in the course of two miles, creating abundant power for manufacture, have given Louisville the name of "Falls City."

In order to make provision for navigation around the falls during low water, a canal two miles in length, built in 1830 and controlled by the Federal government since 1874, extends along the Louisville side of the river. Enlargements were begun in 1916 to accommodate an increased river commerce, and when completed the whole project will represent an expenditure of $9,000,000. Three steel bridges span the river, two between Louisville and Jeffersonville and one between Louisville and New Albany, two suburbs in Indiana. A lighthouse is maintained here by the Federal government and Louisville has the only inland life-saving station in the United States.

Parks. The parks of Louisville are noted for natural beauty and are so located as to be of greatest benefit to the citizens. Cherokee Park (330 acres) has six miles of macadamized roadway, golf links and tennis courts; Central Park has tennis courts and playgrounds; Iroquois Park (670 acres), a woodland of native forest and planted trees, has five miles of macadamized roadway; Shawnee, Fontaine Ferry and Riverview parks are on the banks of the river, and have bathing beaches and water amusements. An eighteen mile boulevard connects these and other parks and extends to the Kentucky state Fair Grounds (200 acres) and to the Government fish hatchery, southwest of the city. The Coliseum, on the fair grounds, cost $110,000 and seats 6,000 people. Churchill Downs and Douglas Park have well-known courses for the famous Kentucky sport, horse racing. Mammoth Cave, one of the natural wonders of the United States, is eighty-five miles by rail south of Louisville.

Public Buildings. Prominent buildings of the city are the courthouse, custom house and post office, city hall, the armory (a large convention hall seating 16,000 people), Y. M. C. A. and Y. W. C. A. buildings, the building of the *Courier-Journal*, and many fine hotels, banks and churches. Louisville contains a number of noteworthy monuments, one to the cause of the Confederacy, another to the memory of Zachary Taylor; and statues of Thomas Jefferson, Daniel Boone, Henry Clay and George D. Prentice, a former Louisville journalist. Abraham Lincoln was born fifty-four miles from Louisville, and a beautiful granite shrine marks the spot of his log-cabin home. Five miles east of the city is the old home and the grave of Zachary Taylor.

Institutions. Louisville has good educational advantages; its schools for higher education are the University of Louisville, with academic, medical and law departments; Louisville College of Pharmacy; Louisville College of Dentistry; Jefferson School of Law; Southern Baptist Theological Seminary; Presby-

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terian Theological Seminary of Kentucky, and State University (colored). There are also the Louisville City Hospital Training School for Nurses and the Kentucky Institute for the Education of the Blind, which has in connection the American Printing House for the Blind (see BLINDNESS, subtitle *Education of the Blind*).

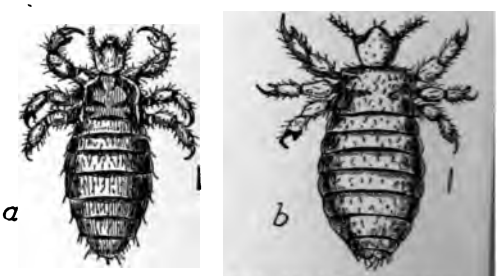
The Carnegie Public Library consists of a fine main building and eight branch buildings and has more than 160,000 volumes (1916). In the main building is an art gallery and a museum of rare collections of birds, plants, shells, relics and curios.

The new city hospital, which has cost $1,000,000, and the United States Marine, Saint Joseph's, the Norton, and Deaconess hospitals; the Masonic Widows' and Orphans' Home, Saint Joseph's Orphan Asylum (Roman Catholic), German Protestant Orphan Home and the Louisville Industrial School of Reform are the largest of many benevolent and charitable organizations.

Industries. Exceptional transportation facilities and rich agricultural surroundings have made Louisville one of the most important trade and manufacturing centers of the South. The value of its annual factory products exceeds $100,000,000. It is probably the largest leaf-tobacco market and tobacco manufacturing city in the world and handles more than one-third of the tobacco crop of the United States. It contains extensive manufactories of whisky, plows, wagons, boxes, bathtubs, flour, furniture, implements, leather, pianos, organs, cement, men's clothing, paint, etc. It is an important market and meat-packing center and has large drug, hardware and wholesale establishments.

History. The first settlement made at Louisville was on an island (now washed away) in the river. In 1779 a party of thirteen families under the leadership of George Rogers Clark, removed from the island to the mainland. The new settlement was named in honor of Louis XVI of France. It was incorporated as a town in 1870, chartered as a city in 1824 and rechartered in 1851, 1870 and 1892. In 1890 the city was swept by a tornado which caused the death of eighty people and a loss of $2,500,000. W.E.M.

LOUSE, *lous,* a parasitic insect that feeds on warm-blooded animals and upon plants. The common louse lives by sucking blood from man and other animals. It is a small, wingless insect, with flat, almost transparent body, hooked feet fitted for holding to hairs, and a beaklike sucker forming the mouth part, which, though soft, can pierce the skin so as to enable the animal to draw the blood. The eggs of lice are called *nits.* They are oval and are attached to hairs by a gummy substance. They hatch in six days and in eighteen days more are capable of reproducing. Personal cleanliness is the best preventive of both head and body lice, but these pests are easily transmitted from one



LICE WHICH ATTACK HUMAN BEINGS
(*a*) Head louse; (*b*) body louse. The perpendicular line at right of each shows adult size.

person to another. Mercurial ointment is considered the best remedy for destroying the insects; the hair may often be rid of them by means of a kerosene wash.

Three species are said to belong to man, several species to birds, one species lives in books or papers, and a winged species of bark louse clusters on the bark of trees.

LOUVAIN, *loo vaN',* a beautiful city in the Belgian province of Brabant, stormed and partly destroyed by the German forces during the first month of the War of the Nations (which see). This city, one of the quaintest memorials of the days of feudalism, is situated about eighteen miles east of Brussels on the Dyle River. Its famous church of Saint Pierre is in ruins, and nothing but the towers are left of its magnificent Gothic cathedral, ranking among the finest in Europe. Four other churches of the fourteenth and fifteenth centuries were also razed. Its beautiful town hall, the Hôtel de Ville, is the most important of the city's old landmarks now standing. Very little of the celebrated university, with its library of 250,000 volumes, is left to tell of the glory of former days.

Destiny decreed a tempestuous history for this little city of about 42,500 inhabitants. In the fourteenth century it was very prosperous due to the enterprise of its cloth manufacture. Then the weavers revolted against their rulers and because of harsh treatment many fled to England. The plague of the sixteenth century again struck a severe blow at its prosperity

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However, by means of its industries, including the manufacture of lace, starch and chemicals, it recovered again, and flourished until the

HÔTEL DE VILLE, OR TOWN HALL
Passed safely through the German bombardment of August, 1914. The building was completed about the year 1450.

great war of 1914 left to its thrifty people only their determined spirit to rise once more, perhaps greater than ever, amid their city's ruins.

LOUVRE, *loo'vr',* PALACE OF THE, a group of magnificent buildings in Paris, containing the largest, and perhaps the most famous, collection of paintings in the world. The palace is an enduring memorial of French history, for the original building served as a strong castle in the Middle Ages, a mansion under Charles V and an elegant château under Louis XIV. Today the Louvre is the great art palace of the people of France. Its beginnings date from Philippe Auguste (1180-1223). Francis I, after 1541, erected that part of the palace which is now called the Old Louvre, and the buildings have been enlarged and adorned by successive kings, until little trace of the original structures remains.

The Museum of the Louvre bears testimony to the creative spirit of the French Revolution. It was opened in 1793, but its origin goes further back, as the kings of France were wont to use the Louvre as a storehouse for artistic treasures. When Napoleon came into power the pictures taken as the plunder of war from Italy, Germany and the Netherlands were installed in the Louvre. At one time half the masterpieces of Europe were in Paris, and although most of the works were later returned to their owners, many remained in the Louvre and are there now. Since Napoleon's time great paintings have continually been added to the famous collection, for the Louvre is the great national museum of the French nation.

Its distinction lies in its masterpieces of famous artists. Every school is represented by a wealth of studies from the brushes of its foremost representatives in art—old masters as well as the best of the modern schools. The Louvre also contains a fine collection of drawings and engravings. It is likewise rich in sculptures, including Greek and Roman, medieval and modern. The two greatest art treasures which have come down from antiquity, the sculptured figures *Venus de Milo* and the *Winged Victory of Samothrace,* are in the Louvre. Of nearly

THE LOUVRE

equal interest are the Egyptian and Asiatic antiquities and numerous antique paintings, vases, bronzes and ornaments.

Consult Van Dyke's *Paris: Critical Notes on the Louvre;* Bicknell's *Louvre.*

LOVE'MAN, ROBERT (1869-), an American poet, best known for the little poem beginning—

> It isn't raining rain to me,
> It's raining daffodils.

Breathing, as it does, the very spirit of spring, with its "buccaneering bee" and its "wild flowers on the hill," it has lent itself readily to musical setting, and has become very popular as a song. Loveman has published several books of poems, most of them very short

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lyrics touching upon some phase of nature or life.

Loveman was born in Cleveland, Ohio, but has spent practically all his life in Dalton, Ga., and the South claims him as one of its poets.

LOW, *lo,* SETH (1850-1917), an American educator and statesman who effected radical reforms in all departments of city administration as mayor of New York, and who also improved the public school system. He was born in Brooklyn, N. Y., and was educated at Brooklyn Polytechnic Institute and Columbia College (now Columbia University). After being graduated from Columbia with honors he became a member of a tea-importing firm headed by his father, but was soon manifesting an active interest in public affairs. He organized and became the first president of the Brooklyn Bureau of Charities, was elected mayor of Brooklyn in 1881 on an independent ticket and was reëlected in 1883. In 1880 he was chosen president of Columbia College, and during his administration the institution was reorganized, the college was moved to its present location and the name changed to Columbia University. Mr. Low donated $1,200,000 for the erection of the library of the university (see COLUMBIA UNIVERSITY).

SETH LOW

In 1899 he was appointed by President McKinley as delegate to the Universal Peace Conference at The Hague. Two years later he was elected mayor of New York City on an anti-Tammany ticket, but was defeated for reëlection on a fusion ticket in 1903. In 1906 he bought 196 acres in Westchester County, New York, and engaged in experimental farming.

LOWELL, *lo'el,* ABBOTT LAWRENCE (1856-), an American lawyer and educator, best known as president of Harvard University. He was born in Boston, his family being one of the most distinguished in the history of Massachusetts. James Russell Lowell was his uncle. He was graduated from Harvard College in 1877 and from the Harvard Law School three years later. For seventeen years he practiced law in Boston, achieving a high position in his profession. In 1889 he had published a little volume, *Essays on Government,* which had attracted considerable attention, but his standing as a writer on government was established in 1897 by his *Governments and Parties of Continental Europe,* a work which is still standard in its field.

ABBOTT L. LOWELL

In the same year he was appointed a special lecturer on government in Harvard University and in 1900 was made a professor. At this time he also became trustee of the Lowell Institute in Boston, an institution founded by one of his ancestors for maintaining free public lectures on religion, science, art and literature. Lowell proved himself an able business man and administrator, and it is for this reason, probably, as much as for his reputation as an educator, that he was chosen president of Harvard University in 1909, to succeed Charles William Eliot. In 1910 he was elected a trustee of the Carnegie Foundation for the Advancement of Teaching.

Besides the works already mentioned, Lowell wrote a number of other books, the most important of which are *Colonial Civil Service* (in coöperation with H. Morse Stephens), *The Influence of Party upon Legislation in England and America,* and *The Government of England.* This last work is to England what James Bryce's *American Commonwealth* is to the United States; it confirms its author's position as one of the leading authorities on the science of government.

LOWELL, JAMES RUSSELL (1819-1891), an American poet, critic and diplomat, born February 22, 1819, at Elmwood, Cambridge, Mass. From the first he was favored by circumstances —favored, but not weakened. His home was beautiful, his family already distinguished in New England history, and his father a well-to-do minister, possessed of "a rare sweetness and charm." From his mother he inherited his wit and his love of poetry. His early education was not systematic, and was obtained largely in the ways that pleased him best—by wide reading and by constant contact with nature and with cultivated people. All his forefathers had been graduated from Harvard, but he neglected every study except literature

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and almost failed to get his degree. That his literary ability was recognized by his classmates is shown by the fact that he was chosen to write the class poem—a thoughtless satire upon the Abolitionists which he published for private circulation.

JAMES RUSSELL LOWELL

In 1840 he was graduated from Harvard Law School, but his profession never really interested him, and while waiting for clients he wrote poetry. His genius was always somewhat indolent, requiring special causes to stimulate it, and love proved the inspiration of his first volume, which appeared in 1841. This little collection of more than ordinary lyrics was called *A Year's Life,* and was dedicated to Maria White, to whom he was betrothed. Her influence on him was strong, and led, after their marriage, in 1844, to his championing the cause of freedom. In 1843 he helped to found *The Pioneer,* a magazine which Poe, Hawthorne and other distinguished contributors failed to make popular. During the Mexican War he began his immortal *Biglow Papers,* a satire in Yankee dialect. The sly humor, the irony, the well-defined New England characters and the political philosophy set forth in trenchant form made the series immediately popular, and the author famous. Such expressions as "This goin' ware glory waits ye haint one agreeable feetur;" "You've gut to git up airly ef you want to take in God;" "I don't believe in princerple, but oh I *du* in interest," became household words.

In 1848 came his best-known poem, *The Vision of Sir Launfal,* which well shows the inspiration which the poet drew from nature and good deeds. The witty *Fable for Critics* appeared the same year, and with all its puns and satiric thrusts proved Lowell one of America's foremost critics. A visit to Europe in 1851, with his family, and one in 1855, after his wife's death, helped to fit him to succeed Longfellow as professor of modern languages at Harvard. As an instructor he was notably successful in making his students think and awakening them to an appreciation of the beauties of literature; and his teaching, together with his editorials, first in the newly founded *Atlantic Monthly* and, after 1864, in the *North American Review,* occupied much of his time. In 1857 he married Miss Frances Dunlap, with whom he lived happily for many years. In 1872 he again visited Europe, and received honorary degrees from Oxford and Cambridge universities.

Meanwhile he had published more *Biglow Papers,* and in 1865 produced his *Commemoration Ode* to the Harvard graduates who died in the war. He himself lost eight relatives in the conflict, and his heart was in the poem, which probably never has been surpassed by any of its kind. *Under the Willows,* issued in 1869, contains the verse of many years, including that called forth by the death of his wife. *The Cathedral* (1870) marks the height of his thought, while his *Memorial Poems* (1877) proved him the greatest American poet of patriotism, and practically closed his poetic career.

Lowell's writings had supported the Republican party, and he was a Presidential elector in 1876. In the following year President Hayes appointed him minister to Spain, and three years later transferred him to England. Lowell possessed remarkable executive ability and common sense, which might have won him fame in some international crisis, but none occurred, and he did little more than to strengthen mutual good will. His uprightness, learning, wit and brilliant oratory, however, made him a prominent man in England. In 1885 his wife died, and in the same year he was recalled to America. There he was still a public figure, for his mind remained vigorous, and no great occasion was considered complete without a word from him. His health grew more and more feeble, however, and on August 12, 1891, he died at Elmwood, where the greater part of his life had been spent. Most of his eminent friends had died before him, and he was buried in Mount Auburn cemetery, near Longfellow.

Lowell was of medium height, broad-shouldered and active. His hair and beard were of a chestnut color. His conversation was delightfully witty, yet always gave the impression, like his writings, of something still better to come. He much preferred writing to revising, yet was far from careless with his work, and never sacrificed future fame to temporary advantage or wealth.

His poetry is great because of its vigorous expression, its witty sayings and its sound common sense. It lacks the grace, evenness and

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simplicity of Longfellow's verse, and the metrical perfection and musical quality of Poe's; it is crowded with allusions and with references to literature and hence is often hard reading. It well repays study, however. His chief prose

ELMWOOD
Lowell's Home at Cambridge.

works are *Fireside Travels,* which contains some delightful fancies and descriptions; *My Study Windows,* containing his descriptive and critical masterpieces which are perhaps best known; and *Among My Books,* two volumes which have placed him above all previous American critics. C.W.K.

Many quotations from Lowell have become well known; of these, the following may be cited:

> They are slaves who dare not be
> In the right with two or three.

> Be noble! and the nobleness that lies
> In other men, sleeping but never dead,
> Will rise in majesty to meet thine own.

> Before man made us citizens, great Nature made us men.

> Talent is that which is in a man's power; genius is that in whose power a man is.

Consult Brownell's *American Prose Masters;* Greenslet's *James Russell Lowell: His Life and Work.*

LOWELL, MASS., one of the greatest textile manufacturing cities of the United States. It is one of the two county seats of Middlesex County, the other being Cambridge, and is situated in the northeastern part of the state, at the junction of the Merrimac and Concord rivers, seven miles from the New Hampshire state line. Boston is twenty-five miles southeast. Transportation facilities are provided by the Boston & Maine and New York, New Haven & Hartford railways, and interurban electric lines extend from the city in all directions. The population in 1910 was 106,294; a Federal estimate in 1916 increased the number of people to 113,245. Only twenty-five per cent of these are Americans. The area of the city is a little less than thirteen square miles.

Lowell is noted for the variety of its manufactures aside from its textile industry. The value of its combined products amounts to $80,000,000 annually, and its factories employ 39,000 people. Immense water power is furnished by the Merrimac River, which has a fall here of thirty-two feet, and by the Concord River. The Canal and Lock Company, organized to supply power to the cotton factories, furnishes water power to Lowell, where it is used extensively, as coal commands a high price. By means of its canals, Lowell develops about 30,000 horse power daily. The larger mills, however, are equipped with steam power machinery for use in dry seasons.

The city claims to have the largest cotton mill, the best textile school, the largest sailcloth factory and the largest hosiery mill in the United States. In one year it produces sufficient cloth to wind seven times around the world. For its product of leather, magnetos, proprietary medicines, mohair plush, phonograph needles and muslin underwear it enjoys a high rank, and in the manufacture of shoes its importance is rapidly increasing. Other products worthy of note are carpets, cartridges, machinery, tools, electrical goods and rubber goods. One of the most interesting things observable in Lowell is the interest displayed by manufacturers in the welfare of the industrial class. The city has an enviable record for labor conditions, and for its system for providing good homes and advantages for education, recreation and amusement. There are night schools, free reading rooms, a library with 90,000 volumes, four high schools which cost $1,600,000, four industrial schools, its excellent textile school, Rogers Hall for girls, and a state normal school. Besides its $500,000 city hall, it has a Federal building, Memorial building, the Ayer Home for Young Women and Children, and one for aged women, four hospitals and nearly eighty churches.

The original name of the city was Chelmsford. In 1822 the Merrimack Manufacturing Company established a cotton mill here and changed the name to its present one, in honor of Francis Cabot Lowell, pioneer in cotton spinning in the United States. The village grew rapidly. In 1826 it was incorporated as a town and in 1836 was chartered as a city. The

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commission form of government, with a mayor and four commissioners, was adopted in 1912. Lowell is the birthplace of J. A. McN. Whistler, the artist, and his old home is now used as an art museum. Features of interest are monuments to Ladd, Whitney, Taylor and Colonel Ellsworth; the latter was the first Union soldier to fall in the War of Secession. J.H.M.

LOWER CALIFORNIA. See CALIFORNIA, LOWER.

LOW GERMAN. See PLATTDEUTSCH.

LOYOLA, *lo yo'la,* or *loi o'la,* SAINT IGNATIUS OF (1491-1556), a Spaniard who began life as a soldier and became one of the greatest of churchmen, winning undying fame as the founder of the Society of Jesus, better known as the Jesuits (which see). He was born in the castle of Loyola, near the little Spanish town of Azpeitia, and was christened Inigo Lopez de Recalde. The name by which he is known in history was assumed after he became a devotee of religion. As soon as he was old enough and had learned to read and write a little, he was sent as a page to the court of Ferdinand and Isabella. There he learned to ride, carry arms and do all the things considered a part of the training of a young Spanish nobleman; later he joined the soldiers of the Duke of Najera.

In a war with France, while helping defend the city of Pampeluna, young Recalde was seriously wounded. He was taken to the castle of Loyola and after weeks of desperate illness grew better. While he was getting well two books were given him which helped to change his whole life. They were *The Life of Christ* and *Flowers of the Saints.* Under the influence of these books, Inigo began to think of devoting himself to the Church, and after a great mental struggle determined to renounce the pleasures of the world.

After a year of prayer and self-denial in the convent of Manresa he wandered about as a pilgrim, helping those in need, preaching and visiting the holy places. In 1524, feeling the need of more learning than the scant education given a Spanish nobleman, and though thirty-three years old, Ignatius entered a grammar school in Barcelona. Later he studied at the universities of Barcelona, Alcala and Salamanca. From Spain he went to Paris, where he took a seven-year course of general and religious training.

It was in Paris, in 1534, that the little group of seven who were to be the core of the famous Society of Jesus first bound themselves together to serve the Church. About six years later Pope Paul III recognized the little Society and gave it his blessing. Loyola was elected the first general and thereafter devoted himself to the writing of its *Constitutions* and *Spiritual Exercises,* and to its organization and government. He succeeded so well in this undertaking that he is known as one of the world's greatest organizers and educators.

Loyola is the man above all others to whom the Jesuits owe their greatness: to his executive ability and farsightedness in providing for the action of each small cog in the machinery of the organization is due the unity and great strength of the Jesuits. He also made the plans for the educational system that produced some of the great Roman Catholic theologians. In 1556, after a short illness, Loyola died, but the Society he had founded became one of the most powerful agents of Christianity, education and civilization in the world. G.W.M.

Consult Thompson's *Life of Saint Ignatius;* Hughes' *Loyola and the Educational System of the Jesuits,* in Great Educators' Series.

LÜBECK, *lü'bek,* one of the three free city states of Germany, the others being Hamburg and Bremen. It is situated in the northwestern part of the German Empire, on the Baltic Sea. Its area is 115 square miles, which includes the city of Lübeck, the town of Travemünde, a number of villages in the surrounding rural district and small isolated portions of Holstein and Mecklenburg-Strelitz. The city of Lübeck, its capital, is at the mouth of the Trave River, twelve miles inland from the Bay of Lübeck. The population of the entire city state is 116,599 (1910), nearly all of whom are in the city of Lübeck.

The city of Lübeck is especially interesting because of its medieval architecture, much of which still remains. The walls and bastions which once surrounded the city have been leveled and are now lovely broad walks. There is in the cathedral of Lübeck some very old and rare wood carving. In the church of Saint Mary's, a pure Gothic type, are paintings by Holbein and Van Dyke. One of the quaintest buildings of the city is the Rathaus, or town hall. Although the city is not as strong commercially as it was in the days of the Hanseatic League, it has long carried on an extensive commerce with Russia, Denmark and Sweden. The chief articles of trade are timber, grain, coal, iron, wire and groceries.

The story of the rise of the three city states of Germany is told in the articles CITY STATES and FREE CITIES.

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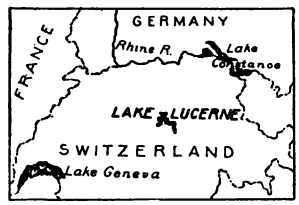
LUCCA, *look'kah,* known as *Lucca, the Industrious,* the chief town of the Italian province of the same name, has an extensive trade in olive oil, silks, velvet, and other textiles, while many of its thrifty people find employment in its foundries and glass and paper factories. It is situated in the northern part of Italy, thirteen miles northeast of Pisa. The town contains about forty churches, some dating back to the seventh and eighth centuries. It is exceptionally rich in artistic and scientific institutions and has four libraries. On the remains of a large Roman amphitheater now stands the city market. The surrounding country abounds in beautiful villas. Sixteen miles north of the town are the baths of Lucca, celebrated since the fifteenth century.

The province of Lucca, which has an area of 558 square miles, is noted for the fertility of its soil and the superiority of its yield. Originally belonging to Etruria, Lucca was taken by the Romans in 177 B.C. Later its power was weakened by the contests between the Guelphs and Ghibellines (which see). In 1815 it was given to Maria Louisa of Spain, and in 1847 her son, Charles Louis, ceded it to Tuscany. In 1860 it became a part of United Italy. Population of city and suburbs, 1911, 76,160.

LUCERNE, *lu surn',* LAKE OF, a lake in Western Switzerland, famous for its beauty. It is roughly in the shape of a cross, with irregular, winding arms between steep, rocky cliffs which in some places have pushed so far out into the water that they have made of Lucerne five divisions. The Bay of Lucerne forms the upper end of the cross, the bays of Alpnach and Küssnacht form the cross arms, the Weggiser See and the Buochser See comprise the main body. Each of these divisions is shut off from the others as far as the view is concerned and each has its own kind of beauty.



LOCATION MAP

Lucerne, a quaint town of Switzerland, on the banks of Lake Lucerne, a favorite city for tourists in Switzerland. The town is divided into two parts by the River Reuss, the modern section with broad streets and great hotels on the west, the medieval town of crooked, narrow streets and old-fashioned houses on the east. In the latter part is the Hofkirche, a church of 1506; the sixteenth century town hall with its collection of art and antiques, and the famou "Lion of Lucerne," a huge dying lion carved i solid rock in memory of the Swiss Guards mas

THE LION OF LUCERNE

The inscription, freely translated, reads: *T the Fidelity and Courage of the Helvetians.*

sacred in defense of the Tuileries, in Paris, Au gust 10, 1792. Population, 1910, 39,152.

LUCIFER, *lu'si fer,* from a Latin wor meaning *light-bringing,* is a name sometim given by poets to the moon, to the plan Venus when it appears as the morning star, an to day. Many writers, among them Milto and Shakespeare, called Satan *Lucifer,* becau the following Biblical reference in *Isaiah* XI 12, was in ancient times wrongly interpreted t mean Satan:

> How art thou fallen from heaven, O Lucife son of the morning! how art thou cut down t the ground, which didst weaken the nations.

LUCKNOW, *luk'nou,* the most ancient the great cities of India, and famous as th scene of a memorable siege during the Sepo Rebellion of 1857. Up to the time of the rebe lion, Lucknow was the capital of the indepen ent state of Oudh, but after the English reca tured the city in 1858, it was made the capit of a district in the United Provinces of Ag and Oudh. See SEPOY REBELLION.

Situated on the right bank of the Gum River, with several suburbs on the opposit side of the stream, the city from a distan presents a striking appearance, with its min rets and gilded cupolas, but a nearer view di closes a crowded Oriental town with narro streets and shabby little houses. There ar however, a number of buildings of modern co struction, and in the better quarter the bro streets are lined with handsome homes. Und English control considerable improvement ha been made in the sanitary conditions. Seven beautiful mosques, relics of former days, relie

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the sordidness of the ancient city. There are produced in Lucknow silver, copper and brass wares, embroideries and cotton fabrics, and the place is an important educational center. The population is about 260,000, of which three-fifths are Hindus, while the rest are Mohammedans and Christians.

LUCRETIA, *lu kre'shi a,* a heroine in early Roman history, the virtuous wife of Lucius Tarquinius Collatinus, who was bitterly wronged by Sextus, son of the seventh king of Rome, known as Tarquin the Proud. After telling her story in the presence of her husband and father and her cousin Brutus, Lucretia slew herself with a dagger. Her death was the signal for an uprising. The Romans took oath that never again would they have a king in Rome, and they placed two consuls at the head of the state, one of them being Brutus. The king and his sons were expelled from Rome and never regained power. See CONSUL.

LUCRETIUS, *lu kre'shi us,* TITUS CARUS (about 99 - about 55 B. C.), a Roman poet of the first rank. The only information concerning his life is found in a brief summary written four centuries after his death. It is said he died by his own hand at the age of forty-four. His great work, *De Rerum Natura* ("Concerning the Nature of Things"), a poem in six books, is still unequaled as a philosophical poem. Its great object was to free mankind from the fears of death and the life hereafter. This poem has influenced the writings of a number of the foremost poets of England; this is evidenced in Tennyson's *Lucretius.*

LUD'INGTON, MICH., the county seat of Mason County, is a freighting center of importance and a summer resort. It is on the east shore of Lake Michigán, at the mouth of the Marquette River, fifty-four miles north of Muskegon and eighty-five miles northwest of Grand Rapids. It is served by the Pere Marquette Railroad and a fleet of car ferries which transfer freight cars across the lake to ports in Wisconsin and the northern peninsula of Michigan. There are also electric interurban lines, and steamboat lines to Chicago, Milwaukee and other lake ports. The area of the city is two and a half square miles. Scandinavians and Germans constitute nearly fifty per cent of the population, which in 1910 was 9,132; in 1916 it was 10,367 (Federal estimate).

A breakwater constructed by the government at a cost of $1,000,000 furnishes the city one of the best harbors on the lake. Epworth Heights, two miles north of Ludington; a student's military training camp north of Epworth Heights, and Hamlin Lake, six miles north of the city, are resorts which attract many summer visitors. The city contains several parks, the county courthouse, a United States weather bureau station and a Carnegie Library. Ludington manufactures lumber, formerly a more extensive industry than at present, game boards, watch-cases and printers' supplies, and has a large trade in grain and fruit.

A settlement was made in 1859 and named for Pere Marquette; the explorer was buried here, but later his body was removed to Point St. Ignace. In 1871 the place was renamed in honor of James Ludington, a lumberman, and in 1873 it was chartered as a city. E.A.N.

LUDWIGSHAFEN, *loot viKs hah'fen,* a city of Southwestern Germany, lying directly across the Rhine from Mannheim, and noted as the commercial center of the Rhine Palatinate. It was founded in 1843 by Louis I of Bavaria, as an outpost against Mannheim. The largest chemical factories in the world, the Badische Aniline and Soda Works, are in Ludwigshafen, and since the opening of the harbor in 1897 its trade has developed greatly. There are manufactories of cellulose, fertilizers, flour, vinegar and malt, sawmills, iron foundries, breweries, brick works and woolen factories. Population, 1910, 83,300.

LUGANO, *loo gah'no,* LAKE OF, known to the Italians as *Lago Ceresio,* lies at the foot of the Alps, 889 feet above sea level. It is fourteen and one-half miles in length and is situated partly in Lombardy, Italy, partly in the Swiss canton of Ticino. The name is derived from the town of Lugano, the only important place on its banks. Picturesque villas stud the lower slopes of the surrounding hills, which abound in vineyards, olive and orange groves, and forests of chestnut and walnut. From Monte Salvatore, 2,982 feet in height, a beautiful view of the picturesque town and lake is obtained.

LUKE, SAINT, "the beloved physician" who accompanied Paul on two of his missionary journeys, and who recorded in the third Gospel, which bears his name, and in the *Acts of the Apostles,* many events of the time in which he lived. He was probably born in Antioch, where he received a good education, not only as a physician but also in literary lines. When Paul went to Troas on his way to Macedonia, Luke joined him, and from that time on he was an intimate friend and companion of the apostle, assisting him much through his knowledge of

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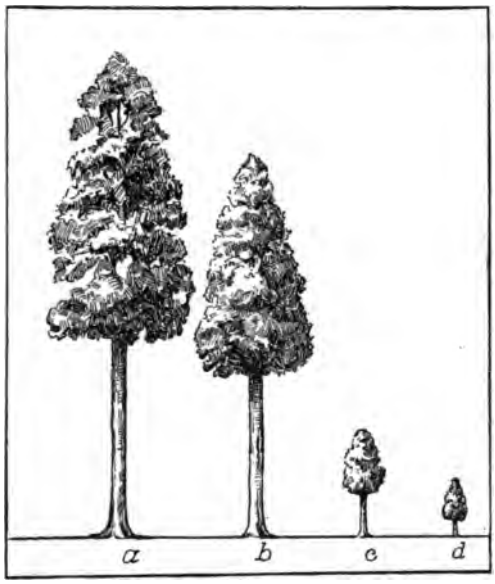
medicine. He was a believer in Christ before he joined Paul, but was probably a Gentile, although some authorities say that he was a Jew. The time and manner of his death are unknown. See GOSPELS; ACTS OF THE APOSTLES.

LUMBAGO, *lum ba'go,* a very painful ailment, seated in the lumbar region. It derives its name from the Latin *lumbus,* meaning *loin.* Usually it is due to a toxic condition of the system arising from intestinal fermentation or to infection somewhere in the body, and is akin to rheumatism. The pain may be a dull ache, but is generally sharp and produces stiffness in the muscles. Rest and warmth are of first importance in the treatment of lumbago. The affection may last for a few hours, or it may continue for weeks and completely incapacitate the patient. Hot drinks, a Turkish bath, and in severe cases, a blister may be employed to relieve the pain, but a physician should be summoned if the attack persists.

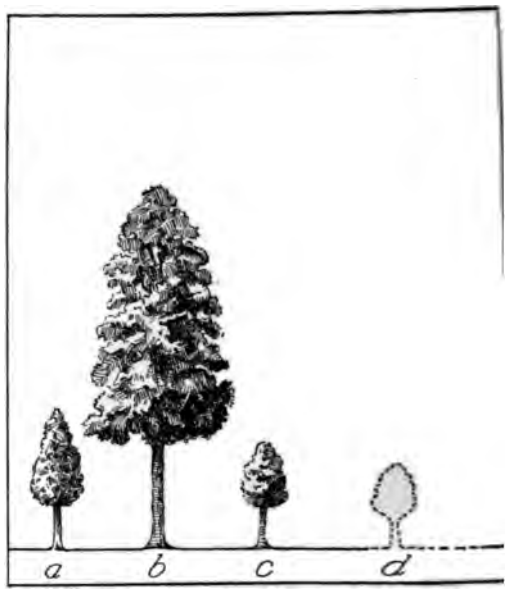
LUM'BER is prominent among those natural resources which have made possible the rapid



THE PRESENT STAND OF TIMBER

In 1917: (*a*) 2,826 billion feet of merchantable timber were standing in the United States, and 800 billion feet in Canada; (*b*) 2,200 billion feet in the United States were in private ownership, and only 40 billion feet owned or leased privately in Canada; (*c*) 626 billion feet in the United States were in public ownership, while 760 billion feet were so held in Canada; (*d*) in the United States 340 billion were owned by eight private companies.

growth of the two great nations of America, the United States and Canada. When the rise of cities, is counted in years or days, rather than in centuries, as in the older parts of the world, wood must be the chief if not the only material of which they are first built. It is said that for every person in the two countries named as much timber is cut as for two people



THE GAIN AND THE LOSS

(*a*) In the United States 9 billion cubic feet i the annual growth, 5 billion cubic feet in Canada (*b*) 23 billion cubic feet is the annual cut in th United States, 3 billion in Canada, including tha used as fuel; (*c*) 7 billion cubic feet is the annua fire loss in the United States, 2 billion feet i Canada; (*d*) an unknown quantity is killed b insects, blight, etc.

in Scandinavia, seven people in Germany o eighteen in Great Britain. In the United State about half of the timber consumed is firewood one cord for every person; in Canada an equa amount is burned by each inhabitant, but th total is two-thirds of the timber consumed. I recent years steel and concrete have supplante timber in larger structures, and there has bee increased use of brick, stone and terra cott But paper making and other industries produc a growing demand for lumber, and the amour of it milled has been about the same each ye for a number of years.

How Trees Are Made into Lumber. Lumbe ing is one of the most picturesque and inte esting of industries. In some parts of the gre forests of Wisconsin, Michigan and Minneso and of Eastern Canada the trees are cut only i winter. The "lumberjacks" are hardy me they carry on their task of cutting and haulin in the worst of weather, and in their spring wo on the river with the floating logs they endu icy baths with no apparent discomfort. Som times the logs float downstream singly, som

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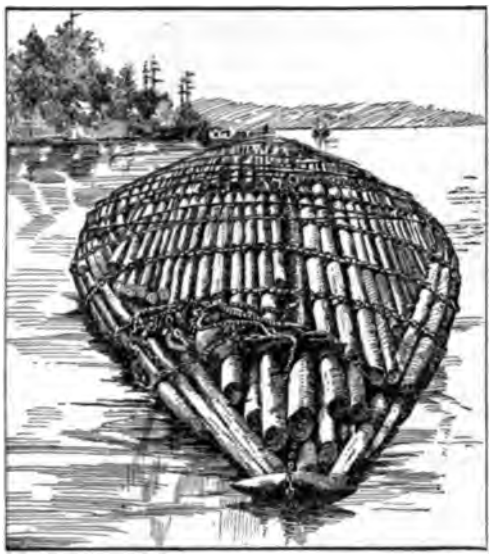
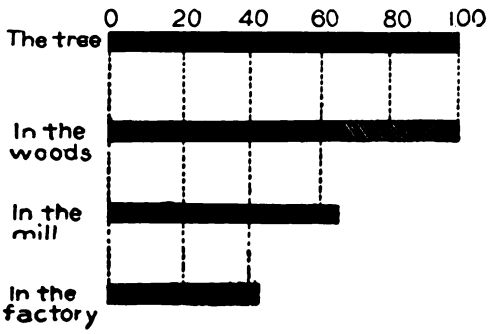
times bound together in a rude raft called a boom. The men travel with them, living in raft shanties. Their business is to see that the logs do not get caught in rapids or falls, or at



LOG RAFT

A common scene on rivers in the Pacific states and in Western Canada. In this way thousands of logs are towed out into the ocean on their way from forest to mill.

bends in the stream, and form a *jam,* and a "lumberjack" can walk on a rolling, tumbling log as easily, apparently, as on a sidewalk. The Mississippi has been one of the great highways for lumber logs, but since the spring of 1916 no



A PART OF THE LUMBER WASTE

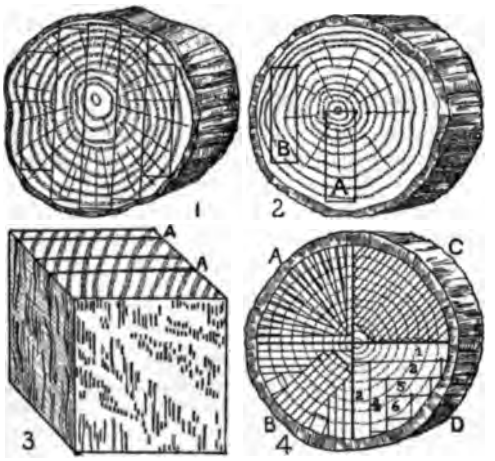
Of the 100 per cent of wood in a tree, 37 per cent is lost in the forest; of the 63 per cent of the tree which reaches the mill only 42 per cent is utilized, and in the factory the part used is only 38 per cent of the original tree.

rafts have been permitted on it. The Ottawa River, in Canada, is now perhaps the most important stream where this type of lumbering may be seen, with all its old-time picturesque and adventurous element.

In the South, from which comes the largest part of the lumber of the United States, railroads are built into the forests and the logs are pulled or *skidded* to the cars either by machinery or by horses. In British Columbia and the Puget Sound region machine power is employed almost entirely, because of the great size of the trees which are cut. In other lands many novel methods of lumbering are practiced, and in Burma you may see, as Kipling says—

> Elephints a-pilin' teak
> In the sludgy, squdgy creek.

After logs reach the sawmills they are handled almost entirely by machinery. They are cut by circular saws or by band saws—long belts of toothed steel moved rapidly by large wheels. Gang saws are parallel sets of circular saws which cut a log into several boards at once. Saws give rough surfaces to the lumber.



HOW LUMBER IS SAWED

In cutting logs the lumberman has three aims: to gain quantity, strength, and, in some cases, beauty. (1) The lines for cutting show a simple method when quantity is important. (2) Plank *B* will warp in drying, because the rings at the outer edge are longer and will shrink more than those at the inner side; plank *A* will not warp. (3) The beauty of quarter-sawed oak is gained by cutting a plank with a silver-grain surface—that is, along the rays *A A*, which run from the center of the tree to the bark. (4) Four methods of quarter-sawing: *A* makes every plank silver-grained and not liable to warp, but wastes over one-fourth of the log; *B* saves time but not material, and the planks are nearly as high grade as in *A*; *C* is economical, but only one-fifth of the planks have real beauty and strength; *D* is for cutting beams, of which *1* and *2* are the best, *5* and *6* the poorest.

Special machines, usually in a separate establishment, called a planing-mill, finish the lumber which must be smooth.

New lumber contains so much sap that it must be dried, either in kilns or in the air. If seasoned in the open air from one to four years it is suitable for most purposes, but will shrink

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if placed on the inside of houses kept hot in the winter. Kiln-dried boards are seasoned for only a few weeks.

The Industry. In Canada, logging and lumbering are by far the most important industries, next to agriculture. In the United States they rank third. Not including lath, shingles, poles, railroad ties, firewood, barrel hoops and other special varieties of wood products, the annual production of lumber in the United States is about forty thousand million *board feet* (see explanation below). In Canada the output is about one-tenth as much, slightly less than that of either Washington or Louisiana, or of Mississippi and Oregon combined.

The principal varieties of Canadian lumber are spruce, douglas fir and white pine. In the United States yellow pine is far in the l with Douglas fir and oak next in importa Aside from the unusual woods, yellow po ash, oak and cypress are the most valuable t bers.

North America has about one-third of the ests of the world. Russia contains two-th of those in Europe and over half of thos Asia, and is by far the greatest lumber expo in the world, though its annual cut is only third that of the United States. The tro forests of South America are among the wo largest. From them come rosewood and hogany and many marvelous woods as yet l known elsewhere.

More about lumber will be found in the cles on pine, oak, and other trees.

Purchasing Lumber

Lumber is ordinarily sold at a price per *board foot,* which is the quantity contained in a piece one foot long, one foot wide and one inch thick. Thus a piece of timber 16 feet long, a foot wide and an inch thick contains 16 board feet. One of the same length and thickness but only 8 inches, or ⅔ of a foot, wide, contains 16x⅔x1, or 10⅔ board feet. A piece 16 feet long, 8 inches wide and 2 inches thick contains 16x⅔x2, or 21⅓ board feet. Because boards less than one inch thick are planed from one-inch boards, they are usually considered to be the latter. Most varieties of lumber are known by the same names throughout the United States and Canada.

Timbers for framing are usually described by their size (see CARPENTRY). Thus a timber 4 inches square is known as a *four by four,* commonly written *4x4.* If it is sixteen feet long it is called a *four by four sixteen.* The price per foot is usually greater for timbers over 18 feet long.

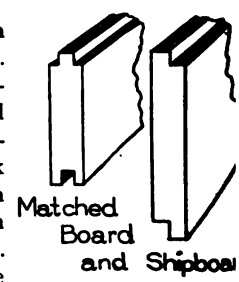
Boards planed on one side only are known as *No. 1 common, No. 2 common,* etc., according to their quality. They are sold in varying length and width, the former usually from 10 to 16 feet, the latter from 6 to 12 inches. The buyer usually specifies the total number of feet he wishes and receives an assortment of sizes; he can, however, obtain all in one size, but in ordering boards of particular length or wi should state that he wants common boards, he may receive those planed on both si which are more expensive. *Finished* boards frequently sold by the *running foot* instead the board foot.

Shipboard is like common boarding, but at the edges, as shown in the illustration.

Matched boards have a tongue and a groo as in the picture. Finished flooring is matched boards, usually four inches wide. estimating the quantity needed, add one-fou to the number of feet of 4-inch boards requir this will equal the loss caused by the tong and groove.

HOW MANY BOARD FEET IN EACH PIECE OF LUMBER?

Siding is made in a number of styles. Clapboards, sometimes called beveled siding, are wedge-shaped; ⅝-inch thick at one edge, ⅜-inch at the other, and from 4 to 6 inches wide. Beveled siding is the best, but requires more labor.



Shingles are from 14 to 18 inches in leng and from 4 to 7 inches in width. An 18-i shingle should not be exposed more tha inches to the weather.

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Planks are ordinarily 2 inches thick and at least 6 inches wide.

Laths are sold in bundles of 100. They are 4 feet long, one and a half inches wide and one-fourth inch in thickness.

Estimating. In deciding how much lumber to purchase for a house like that described in the article CARPENTRY, some parts, such as sills and joists, can be exactly counted. Studs, beams and rafters can also be counted, but as the carpenters may not cut the long pieces exactly as the estimator might plan, it is well to allow a number of extra pieces.

In ordering boards to cover the walls and floor no deductions need be made for openings, for the saving due to them is usually offset by waste. If the boards are to be laid diagonally, the quantity needed will be 10 per cent greater. The number of feet of 4-inch siding required is about one-third greater than the amount of boards for the same area. The number of shingles necessary depends on the width to which each row is to be exposed to the weather. If this width is multiplied by the average width of the shingles to be purchased and by the number of shingles in a bundle, usually 250, the result will be the number of square inches which a bundle may be expected to cover. The amount of nails needed for a building will vary from 20 to 40 pounds per 1,000 square feet of each kind of material, and will be about 5 pounds for each 1,000 shingles. C.H.H.

Consult publications of the United States Forest Service, issued by the Department of the Interior, Washington, D. C.; Kellogg and Ziegler's *Cost of Growing Timber;* Fernow's *Brief History of Forestry in Europe, the United States and Other Countries.*

LUMP'FISH, or **LUMP'SUCKER,** a group of North Atlantic fishes, so called because of their awkward shape and the presence of a sucking disk formed by the union of the back fins (the ventrals). This disk enables them to attach themselves and cling firmly to an object several times their weight. The fish has a grotesque form, with a thick, short head and body; the back is arched into a ridge; the belly flat and the fins rather small. Before it spawns it is beautifully colored with varying shades of crimson, purple, blue and orange, but afterward it changes to a dull olive tint. It attains a good size, often weighing seven pounds. The lumpsucker abounds in the coast waters of the North Atlantic in both hemispheres. The flesh is soft and oily and is therefore not generally esteemed as a food. In Great Britain it is known also as the *cock paddle.*

LUMPY JAW, or **LUMP JAW,** a cattle disease which consists, as the name indicates, in the formation of a lump or swelling on the jawbone. It is caused by a fungus which the animal takes into the system from the grass, vegetables or grain which is eaten. One animal rarely infects another.

Symptoms. A slight swelling of the lower jawbone occurs, usually back in the region of the molar teeth; this swelling, or lump, increases slowly in size until finally it breaks down in abscess formation, and the discharge of a quantity of matter takes place. This leaves a hole, or *sinus,* opening directly into the bone; the discharge persists, the matter becoming more yellow, and "proud flesh" forms around the sides of the opening. The matter then has an offensive odor and contains small, yellowish grains, which, being examined, are found to contain the germ causing lumpy jaw. The animal loses in condition, it cannot eat, and if not cared for it dies.

Treatment. As soon as the disease is recognized, surgical treatment should be started, consisting of a cleansing of the opening and scraping the diseased bone underneath. If this is done thoroughly and in time, the animal may be cured, but if it is allowed to continue long, death will result. S.C.B.

Consult "Investigations Relating to the Treatment of Lumpy Jaw," *Bulletin 2,* United States Department of Agriculture.

LU'NA, the Latin name for the moon. To the Romans, however, this chief ornament of the night was not a planet, but a goddess, who drove her silvery chariot across the sky. This goddess was not always gentle and kind, and was sometimes believed to drive insane those who had seriously offended her. From this old superstition the word *lunatic* grew up, and thus means literally the same as *moonstruck.* But there was another deity, a far more important one, named Diana (which see), and since she was the sister of the sun god Apollo, she must, argued her worshipers, have something to do with the moon. To her, therefore, were gradually transferred the qualities of Luna, until in time the two were merged into one conception. Luna, however, was the original Roman moon goddess, and her worship dated back to the time of Romulus, the founder of Rome, in 753 B.C.

LUNACY, *lu'na si,* a term applied to certain mental conditions produced by disease or defect of the brain, rendering a person not responsible for his acts. The words *lunacy* and *lunatic* were derived from *luna,* meaning the *moon;*

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this is explained in the article LUNA. The study of lunacy is one of the most difficult subjects of medical inquiry. In the United States, Canada and in most other countries, the laws require that protective authority be exercised over lunatics and idiots, in order to prevent injustice. Every person is presumed by law to be of sound mind until proved to the contrary; if lunacy is proved before a competent court, the patient may be placed under guardianship. Insane persons are incapable of judging between right and wrong, and they are not held responsible personally for their criminal deeds, but may be held liable civilly for damage resulting from their wrongful acts, and may sue, or be sued, in the name of their guardians. See INSANITY.

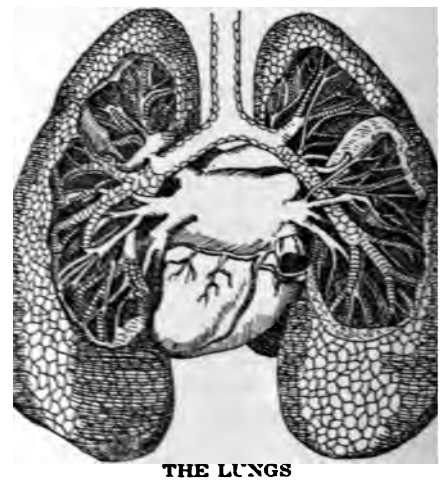
LUNAR CAUSTIC, *lu'nar kaws'tik,* or **NI'TRATE OF SILVER,** is a very important chemical compound much used medicinally in diseases of the stomach and intestines. When melted at a high temperature and molded into sticks, it is used to cauterize poisonous wounds and to remove warts or "proud flesh." It has even been applied in smallpox to prevent pitting. Chemically, it is of value as the primary compound from which other silver compounds are made. It is blackened by exposure to light and leaves a brownish-black stain on the fingers. It is the basis of many black hair dyes and of some indelible inks.

LUN'DY'S LANE, BATTLE OF, in the War of 1812, was an engagement fought on Canadian soil about a mile from Niagara Falls, on July 25, 1814. With the exception of the Battle of New Orleans, which was fought after the treaty of peace was signed, this was the last important battle of the war. The British forces, driven back after the failure of their attack on Chippewa, took up a new position on Lundy's Lane, a roadway within sound of Niagara's roar, where they received reënforcements under General Drummond. At Chippewa was an American army of 4,000 men under the command of General Jacob Brown. On the afternoon of July 25, Brown ordered General Winfield Scott to advance on Queenstown with a force of about 1,300 men. While on the march Scott's forces came upon the British, about 2,800 strong. It was then five o'clock, but before darkness fell General Brown arrived on the field with reënforcements from Chippewa. The battle raged until midnight, the losses on both sides being severe.

Both sides claimed the victory, but neither won a decided advantage. The Americans withdrew unmolested from the field, and ret first to their original camp at Chippewa, then to Fort Erie. They made no further tempt to invade Canada. In this battle Canadian militia upheld their reputation, won warm praise from General Drummond their zeal and gallantry. See WAR OF 1812.

LUNENBURG, *loo'nen burg,* the cou town of Lunenburg County, Nova Scotia. is situated seventy miles southwest of Hali on a small bay on the Atlantic coast, and the Halifax & Southwestern Railway. It h fine harbor and considerable foreign trad fish and lumber, particularly with the Un States and the West Indies. The fishing fl which make Lunenburg their headquarters c prise about 150 vessels and employ over 2 men. The town has machine shops and fou ries, shipyards and various establishments ship supplies. It was settled in 1753 by (mans, and still retains a distinctly German mosphere. Population in 1911, 2,681.

LUNGS, in the body of man and o vertebrate (backboned) animals, a pair large, spongy organs, lying in the chest cav They are intimately connected with one of processes upon which life itself depends,



THE LUNGS
With trachea and bronchial tubes exposed.

they are the most important of those org through which breathing, or respiration, is ried on.

Description. The lungs form a pyram shaped mass whose base rests on the diaphr muscle, and the top of which is up behind collar bone. Between the two lungs are œsophagus, the heart and the larger blood sels. At the top they are united by the wi pipe (see TRACHEA), which, after it enters

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chest cavity, divides into a right and left *bronchus*. Each bronchus enters a lung, where it divides and subdivides into countless minute tubes, the smallest of which open into cup-shaped depressions known as *air sacs*. Each of these has upon its inner surface a close network of blood tubes called *capillaries*. The air sacs are arranged in groups known as *lobules*, and the lobules are united into *lobes*. There are two lobes in the smaller left lung, and three in the right.

The bronchial tubes and blood vessels, together with lymphatics and nerves, with which the lungs are also supplied, are all bound together by elastic tissue; the lungs can therefore stretch like rubber bags when filled with air. In proportion to their size they are the lightest organs of the body, weighing in man about three and one-half pounds and in woman about two and three-fourths pounds. The lungs of a baby are pinkish, those of an adult slate-colored and mottled, and those of an elderly person of a still darker tint. The change in color is more pronounced in the lungs of city dwellers, who live in a smoky and dusty atmosphere, than of those who breathe the pure air of the country.

The Work of the Lungs. It is by means of the lungs that the body cells are kept supplied with oxygen. As the blood circulates through the body, carrying nourishment to its tissues, it gives up oxygen and absorbs impurities, and must be sent to some central supply station to be renewed. The lungs constitute this supply station. With each intaking of the breath a quantity of fresh air containing oxygen is carried to the lungs, and the oxygen, seeping through the thin walls of the air sacs and of the capillaries embedded in them, is absorbed by the blood, to be carried to all parts of the body, while the waste material (carbon dioxide) is expelled as the air is breathed out again. The process of taking air into the lungs is known as *inspiration*, and that of expelling it as *expiration*. In the ordinary breathing of an adult about eighteen inspirations and expirations occur every minute, night and day. The extent of lung surface exposed to the air is surprisingly large; if the walls of the air sacs could be spread out flat and placed side by side they would cover an area of 2,600 square feet. It has been estimated that about twenty-five ounces of oxygen are taken into the body each day. A detailed description of the processes of inspiration and expiration may be found under the heading BREATH AND BREATHING.

Diseases and Care of the Lungs. The most dangerous of the diseases peculiar to the lungs are *pneumonia* and *consumption*. Both are infectious diseases and both are most prevalent among those who live in crowded, insanitary quarters and are forced to breathe foul air. Pneumonia is inflammation of the air cells in the lungs; inflammation of the bronchial tubes is known as *bronchitis;* and *pleurisy* is the name given to inflammation of the *pleura*, the thin, elastic membrane that covers the outside of the lungs. The importance of having public halls, schools and homes well supplied with fresh air is more and more being emphasized as the weakening effect of bad air on the lungs and on the entire system is becoming generally recognized (see HEATING AND VENTILATION). It is also important that the lungs have ample space in which to expand and contract. The practice of wearing clothing that restricts the movements of the ribs and abdomen in the breathing process, and habits that make one stooped and round-shouldered, cannot be too strongly condemned.

Alcoholic beverages and cigarettes should be avoided by anyone who wishes to have a strong, healthy pair of lungs. Alcohol tends to diiate the blood vessels and to thicken the walls of the air sacs, decreasing the supply of oxygen and interfering with the interchange of oxygen and carbon dioxide. Habitual users of alcohol are especially susceptible to pneumonia. Cigarette smokers, in order to secure the full enjoyment of the weed, usually draw the smoke into the lungs, and the poisonous nicotine is absorbed by those organs. S.C.B.

Consult Janeway's *Respiration*.

Related Subjects. The reader is referred to the following articles in these volumes:

Asphyxiation	Heart
Breath and Breathing	Pleurisy
Bronchitis	Pneumonia
Circulation of the Blood	Pulmotor
Drowning	Tuberculosis

LUNGWORT, *lung'wurt,* a perennial herb of the *Mertensia* family, named in honor of Franz Mertens, a German botanist. It is known also as *Virginia cowslip* and *bluebell,* and is a favorite early spring flower from Southern Canada to South Carolina and west to Nebraska. The flowers are trumpet-shaped, pink in the bud, but afterward purplish-blue, and hang in loose clusters at the end of a smooth, leafy stem. The leaves are large and at first are rich dark purple, later becoming bluish-gray. When mature the flower has four seedlike nuts of a leathery appearance.

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The name is also applied to an olive-green lichen found on trunks of trees in mountainous regions in North America and Europe, and to an European plant with small, purple flowers, whose white-spotted leaves were supposed to resemble a diseased lung. Both of these plants were once used as remedies for lung trouble.

LUPERCALIA, *lu per ka' li a*, one of the most ancient of Roman festivals, celebrated annually in honor of Lupercus, a rural Italian deity, afterwards identified with Pan, the god of herds and fruitfulness. The rites took place at the Lupercal, a cave in the Palatine Hill, Rome. Goats and dogs were sacrificed, and their skins were cut into lashes. Armed with these the priests ran through the byways, striking all the people they met. The ceremony typified purification. It took place on the fifteenth of February, which was originally the last month of the Roman year.

The Lupercalia is frequently mentioned in literature, which fact possibly emphasizes its ancient importance. Mark Antony, in his oration over the body of Caesar, as given in Shakespeare's *Julius Caesar,* exclaimed:

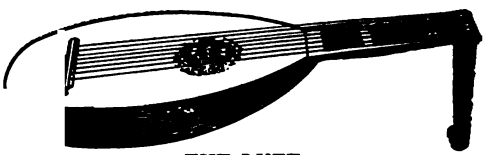
You all did see that on the Lupercal
I thrice presented him a kingly crown,
Which he did thrice refuse: was this ambition?

LUPINE, *lu' pin,* a group of herbs and shrubs of the pea family, whose generous content of nitrogenous matter makes them valuable to the farmer by enriching the soil (see NITROGEN). The name comes from the Latin *lupinus,* meaning *wolfish;* it is not known why it was so applied. Lupines grow in the temperate regions of North and South America, about ninety species being native to the United States and Southern Canada. They bear beautiful white, yellow or blue flowers, resembling small sweet peas, and are cultivated for decorative purposes, both in gardens and in greenhouses.

LU'PUS. When the germ of consumption attacks the skin, usually producing various-sized pimples on the face, the trouble is named *lupus.* It is to be regarded, like all consumptive troubles, as a terrible enemy, running a slow, gradual course and possibly breaking down to form ulcers, which spread slowly over the face. The location which seems to be commonly selected is the cheek, in the region of the nose. In the beginning of the trouble, several hard pimples appear; they are in size from a pinhead to a pea and are of a brownish-red color. These break down and form ulcers, which, if they heal, leave bad scars. Lupus is very slow in its progress, but in the end often results in death. Great care should be used in treatment, and the utmost patience must be exercised. Only a competent physician should be permitted to care for the patient; home remedies are usually of little value. S.C.B.

LURAY, *lu ra',* **CAVERNS,** a group of underground chambers near the town of Luray, Va., discovered by Andrew J. Campbell and his companions in August, 1878. These underground galleries are in the limestone belt of the Shenandoah Valley, on the west side of the Blue Ridge Mountains. The area explored extends over about 100 acres, under some of the low spurs of the Blue Ridge. Electric lights have been installed, so one may see the many stalactites, snow-white, pink, blue and amber-colored, the hundreds of chambers and the tiers of galleries, some of which are 260 feet high. Many of the columns are over fifty feet in height and give out a hollow, bell-like sound when struck. About 20,000 visitors register each year. See STALACTITE AND STALAGMITE.

LUTE, an ancient, stringed, musical instrument, formerly a great favorite, but in modern times almost entirely supplanted by the harp and the guitar. It originally contained six strings, but the number was gradually increased



THE LUTE

Probably the most-frequently quoted lines with reference to the lute are from Tennyson's *Idylls of the King:*

It is the little rift within the lute
That by and by will make the music mute,
And ever widening slowly silence all.

to twenty-four, between the fourteenth and the seventeenth centuries. The instrument consisted of four parts—the table, which contained a round opening in the middle; the body, which was shaped like the back of a present-day mandolin and contained nine convex ribs; the neck, which had the same number of divisions; and the head, or cross, which contained the screws for tuning. The lute is played by striking the strings with the fingers of the right hand, while the sound is regulated by those of the left.

LUTHER, MARTIN (1483-1546), the foremost leader in the reform movement of the sixteenth century through which the Protestant Church had its birth, and one of the greatest religious figures of any age. The founder of Protestantism was born on November 10, 1483, at Eisleben, Saxony, in the heart of Germany. He

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was the most promising of a large family of children, and his father, a slate-cutter of very slender means, was determined that this son should receive a good education. Accordingly, sacrifices were made to send him to school at Magdeburg and at Eisenach, where he helped to support himself by singing in front of the homes of the rich. In 1501 he entered the University of Erfurt, winning a master's degree there four years later.

MARTIN LUTHER
The man who established the Protestant Church in the world.

Luther had planned to take up the profession of law, but about the close of his university career he came deeply under the influence of a religious revival that was sweeping over Western Europe, and shortly after taking his degree he entered the monastery of the Augustinian Order at Erfurt. In 1507 he was ordained a priest, and the following year was appointed to the chair of philosophy at the new University of Wittenberg. In 1512, on his return from a visit to Rome in the interests of his Order, he took his degree of doctor of divinity, and having been appointed professor of theology at Wittenberg began there a course of lectures on the Bible.

Students from far and wide were soon flocking to the obscure university to attend these lectures, but just when Luther was enjoying his greatest prestige he was called upon to oppose what he felt to be a great abuse in the Church, that is, the method of granting indulgences. At that time an indulgence was the remission of temporal punishment for sin, the guilt of which was already forgiven. Indulgences were granted in return for the performance of some work of piety, charity or mercy, which might include a gift of money to further some good work.

In the year 1517, Johann Tetzel, a Dominican priest, appeared in the vicinity of Wittenberg as the messenger of Pope Leo X, asking the people to secure indulgences. The proceeds of this sale were to go toward the building of Saint Peter's at Rome. When Luther heard that the people were flocking in great crowds about the preacher of indulgences he was sorely distressed, for he was convinced that the methods of Tetzel were harmful and contrary to the teachings of the Church. He made public his objection by nailing to the door of All Saints' Church in Wittenberg a protest which has become celebrated as the "ninety-five theses;" these were destined to bring about a breach in the great Roman Catholic Church that has never been healed.

The effect of these sledge-hammer blows against the abuse of indulgences astonished even Luther himself. Though written in Latin they were translated into German and then into various other languages and distributed throughout Europe, and it was not long before their author found himself the storm-center of a great controversy in the Church. His study of the Bible and of Church history and law bore him further and further from the accepted doctrines, and when, in 1519, he engaged in a public argument with the famous Dr. John Eck, at Leipzig, he openly denied the supremacy of the Pope. In 1520 he announced his position in three remarkable pamphlets, *An Address to the Nobility of the German Nation, The Babylonian Captivity of the Church* and *The Liberty of a Christian Man.* In the same year he publicly burned, at Wittenberg, a copy of a Papal bull threatening him with excommunication (see BULL).

LUTHER'S HOME
In Frankfort-on-the-Main.

Luther's defiance of the Pope was followed by a summons to appear before the Imperial Diet which met at Worms in April, 1521. This was an assemblage of German princes, nobles and clergy convened by the newly-elected emperor, Charles V. Luther's answer to the demand of the Diet that he retract his heretical

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statements, was as follows: "I cannot, I will not retract anything, unless what I have written shall be shown contrary to Holy Scripture or to plain reason, for to act against conscience is neither safe nor upright." He closed with the words, "Here I stand. I cannot do otherwise. God help me. Amen."

Though placed under the ban of the empire, he was allowed to start for home in safety, but while passing through a valley near Eisenach he was seized by a band of masked horsemen and carried to the castle of Wartburg. This

LUTHER MONUMENT AT WORMS

was done by order of his good friend Frederick, elector of Saxony, who feared for his safety but dared not protect him openly. During a ten-months' sojourn in the castle Luther made a translation of the New Testament from the Greek into German, an event which marks an epoch in the history of German literature. There also he wrote his treatise on *Monastic Vows*.

In March, 1522, he returned to Wittenberg to begin the great work of organizing his new church, and the story of his life from that point is the story of the Reformation. The social unrest of the times, culminating in the terrible Peasants' War, which broke out in Germany in 1525, could not turn him from the cause to which he had dedicated his life. He worked out a new order of church services, and a new system of church government; he wrote catechisms for the instruction of the common people, and he voiced his religious faith and his zeal in a number of fine hymns. The best-known of these, *Ein' Feste Burg,* which has been called the "battle hymn of the Reformation," begins with the stirring lines:

A mighty fortress is our God
A bulwark never failing;
Our helper He amid the flood
Of mortal ills prevailing.

In 1525 Luther married Katharina von Bora, who had, like himself, renounced the life of the cloister. His domestic life was happy, and his hospitable home was a shelter for six children of his own, several orphaned nephews and nieces and numerous impoverished students. He died while on a visit to Eisleben, in 1546. His body was taken to Wittenberg and interred in the famous church on which, twenty-nine years before, he had nailed his ninety-five theses. In 1858 Frederick William IV replaced the old wooden doors of the church with bronze ones bearing the text of the theses. In the city there is a statue of the great reformer, on which is inscribed in German this legend: "If it be God's work, it will endure; if it be man's work, it will perish." B.M.W.

Consult Smith's *Life and Letters of Martin Luther;* Lindsay's *The Reformation in Germany.*

Related Subjects. In connection with the study of Luther, the reader is referred to the following articles in these volumes:

Bull	Protestants
Eck, Johann Maier von	Reformation, The
Indulgence	Saint Peter's Church
Peasants' War	Tetzel, Johann

LUTHERANS, *lu'theranz,* the members of the various branches of the Church which was established in Germany by Martin Luther during the Reformation of the sixteenth century (see REFORMATION, THE). At the present time nearly all of the Protestants in that country belong to the United Evangelical Church, a union of the former Lutheran and the Reformed or Calvanist churches. Lutheranism is now the established religion of Denmark, Norway and Sweden, and the leading religion of the German Empire. A large part of the population in Poland, Prussia, Bohemia, Silesia and Moravia have embraced this faith, and in the United States it has a strong foothold, for there are about 2,445,000 communicants in all the Lutheran bodies. In Canada there are nearly 230,000 in this Church.

When Luther began his work of reformation in the Catholic Church he did not intend to start a new organization, but that was the final result, and the opponents of the reform movement called the Protestants *Lutherans* in derision, although their Church was rightly known as the Evangelical. In 1530 the theologians of the new Church stated their doctrines in the Augsburg Confession, which was adopted, when the Church was recognized by the state twenty-five years later, as the expression of the creed of Lutheranism. At the

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present time it is the only statement of doctrine universally recognized by all the divisions in the Church. Their chief doctrine, around which all others radiate, is justification by faith; they also believe in a true sacramental, but not the material, presence of Christ in the Lord's Supper. No other Church has so extensive a doctrinal literature.

The preaching in the regular services consists in teaching rather than in exhortation, and the ministers are trained for their work in colleges established for the purpose. The largest of those in the United States is the Concordia Seminary at Saint Louis, Mo., while another splendid school, the Wittenberg Seminary, is located at Springfield, Ohio. There are five general independent organizations in the Lutheran Church of the United States, the largest being the Synodical Conference of Missouri. Each of these has several divisions, governed by a synod, which acts as an advisory body.

Consult Finck's *Lutheran Landmarks and Pioneers in America.*

LÜT'ZEN, BATTLES OF, two famous battles which were fought in the vicinity of the small town of Lützen, in the Prussian province of Saxony. The first battle took place in November, 1632, during the religious struggle known as the Thirty Years' War (which see). Gustavus Adolphus, king of Sweden, had been moving toward Bavaria, but delayed his plans for conquest there on account of the advance of Wallenstein, commander-in-chief of the armies of the Emperor Ferdinand II. The Swedish leader united his forces with those of Duke Bernard of Saxe-Weimar, and after a hard fight Wallenstein was forced to resign the field of battle to the Swedes, but Gustavus Adolphus was killed. This engagement was of signal importance, for it saved the day for Protestantism in Germany. The second battle occurred on May 2, 1813, not far south of the scene of the first battle. It was the first great combat of the united Russian and Prussian army with Napoleon's forces. Superiority in number gained the victory for the French, although 20,000 men were lost. By this engagement the French regained possession of Saxony and the Elbe.

LUX'EMBURG, a land-locked grand duchy in Europe, one of the smallest independent states in the world. Its 999 square miles are hemmed in by Belgium and Germany, except for a strip of about fifteen miles which touches France. Luxemburg is one of the striking examples of artificial boundaries created by the jealousies of the great European powers. The duchy originally included a much larger portion, which is now a province of Belgium. The Belgians tried to incorporate the whole of Luxemburg into their kingdom after the revolution of 1830, but the powers insisted on forming the independent state which is now the grand duchy. Most of its inhabitants (259,891 in 1910) are of German origin, and speak a

LOCATION MAP
The grand duchy is a little smaller than the state of Rhode Island.

German dialect, with which a great many French words are mixed. French is the language of the court and of business, and is common along the Belgian and French frontiers. Commercially Luxemburg is largely dependent on Germany.

Physical Features. Physically, as in other ways, Luxemburg is not a unit. The northern part is a continuation of the Ardennes Plateau, and rises to an occasional height of nearly 2,000 feet. The southern portion is noticeably lower, is an extension of the Lorraine Plateau, and is remarkable for its fertility. Practically the entire duchy lies in the basin of the River Moselle, which with its chief tributaries, the Our and the Sure, drains eastward. The climate is more changeable than that of Belgium and not as mild.

Industries. Most of the people are dependent on agriculture, over one-half of the total area being arable lands. Cereals and fruits, especially grapes, are extensively raised. Luxemburg also has rich deposits of iron, copper and lead, but only the iron mines are being worked on a large scale. Echternach and Diekirch have great blast furnaces, but Luxemburg, the capital city, is the chief manufacturing center. Besides pig iron and iron products the duchy is a large manufacturer of leather,

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gloves, paper, malt and distilled liquors and sugar.

Government, Religion and Education. Luxemburg is a constitutional monarchy ruled under the constitution of 1848 as revised in 1856 and 1868. The chief power is in the hands of the hereditary grand duke (or duchess). The chamber of deputies, whose fifty-three elected members serve six years, passes the laws, which are usually introduced by the grand duke and must all be sanctioned by him. There is also an advisory council of state, appointed by the grand duke. The minister of state, who is the active executive, is assisted by directors of finance, justice and the interior, all appointed by the monarch. The government allows entire freedom of worship, but the whole population, except about 4,000 Protestants and 1,300 Jews, is Roman Catholic. Education is controlled by the state, and primary education is compulsory. Luxemburg has no university, but has a number of classical and other schools which offer suitable preparation for the universities of neighboring countries.

History. The country of Luxemburg, originally called Lützelburg, was one of the minor principalities of the Holy Roman Empire. It came into prominence in 1308, when Count Henry IV of Luxemburg became Holy Roman Emperor as Henry VII. Henry's grandson, Charles IV, also Emperor, raised Luxemburg to the rank of a duchy, and presented it to his half-brother, Wenceslas, whose descendants held it until 1437. After being owned by Austria and by Burgundy and then again by Austria, Luxemburg finally, in 1555, became the personal property of the kings of Spain, but remained a principality of the Holy Roman Empire. By the Peace of Utrecht, 1713, it was ceded to Austria, which lost it again when France conquered it in 1795. After the fall of Napoleon the Congress of Vienna created Luxemburg a grand duchy, made it a member of the Germanic Confederation, and gave it to William I, king of the Netherlands, in exchange for his ancestral estates of Nassau, which were taken by Prussia.

In 1831 attempts were made to incorporate Luxemburg into the new kingdom of the Belgiums. The powers, as usual, intervened, and declared that a part of the duchy must be left to the king of Holland. The king, however, declined to accept this arrangement until 1838, when the present boundaries were established. In 1866, when the old Germanic Confederation was dissolved, the Dutch king, William III, proposed to sell Luxemburg to France. This offer nearly caused war with Prussia, whose soldiers had garrisoned the duchy for fifty years. In 1867, by the Treaty of London, France, Prussia and Great Britain agreed to the independence and neutrality of Luxemburg; the Prussian soldiers, however, were not withdrawn until 1872.

Luxemburg remained a possession of the king of Holland until the death of William III in 1890. King William left no male heirs, and by the Salic law, which was still in force in Luxemburg, the throne of the grand duchy could not pass to a woman if any male heirs survived. Wilhelmina thus became queen of Holland, but a distant relative, Duke Adolf of Nassau (1817-1905), became grand duke of Luxemburg. With the death of Adolf's son, William Alexander (1852-1912), the male line of the house of Nassau came to an end, and the throne passed to his eldest daughter, Marie (born 1894). In August, 1914, on the outbreak of the War of the Nations, a German army demanded free passage through Luxemburg to France; the Germans seized the state railways and practically assumed control of the grand duchy, against the heated protests of Grand Duchess Marie and her government. The German government, however, promised reparation for any damage which might result from the invasion. H.M.

Consult Renwick's *The Grand Duchy of Luxembourg and Its People.*

LUXOR, *luk'sawr.* See THEBES.

LUZON, *lu zon',* the largest of the three thousand islands of the Philippine group. For description, see PHILIPPINE ISLANDS.

LYCEUM, *li se'um,* originally a gymnasium of ancient Athens which received its name from the adjoining temple of the Greek god, Apollo Lyceus. It was used by Socrates, and at a later period by Aristotle and his disciples, who discussed their philosophy while wandering through the shady groves for which the place was noted. Modern usage applies the term to preparatory schools for young men, to lecture platforms, and, occasionally, to public halls and assembly rooms.

LYCURGUS, *li kur'gus,* according to tradition, was the author of the laws and institutions of ancient Sparta. He lived during the ninth century B.C., and was a son of the Spartan king Eunomus. In order to study the laws of other nations, he traveled extensively in Greece, Asia and Egypt, and upon his return to his native land he was requested by the

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community to draw up a new code of laws. He thereupon remodeled the old constitution and established a new social order, which gave the people a voice in public affairs and led to the development of Sparta into a great military state. When this was accomplished, Lycurgus exacted a promise from his countrymen not to alter the constitution until he returned from a proposed journey. He then voluntarily exiled himself in order that the Spartans would be bound by oath to preserve intact and forever the laws he had introduced. The time and place of his death are unknown. Historians doubt the authenticity of some of this traditional account of his life, and some authorities regard him as a mythical personage. See SPARTA.

LYDIA, *lid'ia,* an ancient country in Asia Minor, famous for its fertile soil and its rich mineral deposits, especially the gold of the River Pactolus. The Greeks believed that the sands of this river produced the precious metal after the unhappy King Midas (which see) had bathed in its waters to rid himself of the touch that turned everything to gold. Lydia lay between the sea and Phrygia, on the west and east, and Mysia and Caria, on the north and south. In the seventh century B. C. it was an independent and prosperous kingdom, but in 546 B. C. the last king of the Lydians, the celebrated Croesus (which see), was conquered by Cyrus the Great. Thereafter the country was subject in turn to the Persians, the Greeks and the Romans. The Lydians are supposed to have invented the art of dyeing wool and of smelting and working ore. Their capital city was Sardis, near whose ruins may now be seen the straggling huts of a tiny village.

LOCATION MAP

LYELL, *li'el,* SIR CHARLES (1797-1875), a British scientist of the nineteenth century who is considered by many to be the founder of modern geological science. He was born at Kinnordy, Scotland, and educated at Oxford University. He was admitted to the bar, but soon abandoned the law to devote himself to geological research. After making several geological tours in 1824, and again in 1828-1830, he published his investigations in the *Transactions of the Geological Society.* Portions of his first important book, *Principles of Geology,* form the basis of the *Elements of Geology,* the sixth edition of which was published in 1865. In the *Antiquity of Man* he offers the theory that the race of man is much older than is generally believed. He was knighted in 1848, and was created a baronet in 1864. Lyell lent his influence to securing recognition for Darwin's theory of evolution, a system which he foreshadowed in his *Principles of Geology.* See EVOLUTION; GEOLOGY.

LYMPH, *limf,* a colorless fluid, which is in composition like blood but does not contain the red coloring matter (red corpuscles). From this fluid the body cells get nourishment, the lymph being first collected from the blood itself by an intricate process of filtration. The lymph not only nourishes the body cells but also collects impurities from them and thus assists in protecting the body from harmful influences.

Chyle. Lymph which has absorbed nourishment from the digested food in the intestine is called *chyle.* This is later poured into the blood stream and given to the body cells as food.

The Lymphatic System. Lymph is carried by its own special system of vessels, which are called *lymphatics.* These have their origin in fine vessels lying adjacent to the fine blood vessels; growing larger, they are called *trunks;* these trunks unite to form still larger vessels called *ducts.* The *thoracic duct,* the most notable example, carries the lymph and chyle from nearly the whole system of lymphatics and empties into the big vein under the collar bone. This thoracic duct is about fifteen to eighteen inches long, lies along the front of the spine and begins below with a dilated portion or reservoir, called the receptacle of chyle. It is about the size of a goose quill above its reservoir, or place where it receives the flow from its tributaries.

Lymphatic Glands are enlargements along the trunk of a lymphatic vessel, and are most thickly distributed in certain parts of the body, as the neck, the armpit and groin. They drain poison from the blood and near-by tissues in time of need and peril, thus protecting the body from harmful influences. S.C.B.

LYMPHATICS, *lim fat'iks.* See LYMPH, subhead *The Lymphatic System.*

LYNCHBURG, *linch'berg,* VA., a distributing and manufacturing center of importance, having exceptional transportation facilities through the service of the Norfolk & Western, Chesa-

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peake & Ohio and Southern railways. It is situated southwest of the geographical center of the state, on the south bank of the James River and on the James River Canal. Richmond is 125 miles east and north and Washington, D. C., is 174 miles northeast. In 1910 the population, almost entirely American, was 29,494; it had increased to 32,940 in 1916 (Federal estimate). The area is four and one-half square miles.

Lynchburg has a picturesque location. The steep ascent from the river is broken into terraced hills, ornamented with fine trees and handsome residences, with Blue Ridge Hills and the Peaks of Otter in the background. About ninety acres of the city are assigned to its parks. Lynchburg has a number of fine educational buildings; its high school was erected at a cost of $125,000. One of the Randolph-Macon system of colleges is located here and occupies one of the most beautiful sites of the vicinity. Virginia Christian College, two business colleges and Jones Library furnish additional advantages for education. The Federal building was completed in 1914; this, and fine bank buildings, the Auditorium, Y. M. C. A. building and Masonic Home and Retreat are the conspicuous structures of the city.

Two dams constructed in the James River furnish water power for manufacturing purposes. The largest single industry is that of making shoes, though it was established here as recently as 1900. Next in importance is the tobacco industry, a superior grade of leaf being grown in this locality; coal, iron ore and granite are also found in this region. Among the other shipments are iron and brass products, cotton goods, plows, wagons, dyes, hardware, flour and lumber. The city has the largest bark extract wells in the United States, and the second largest flour mill in the South.

The first settlement was made in 1786, the town was incorporated in 1805, and it became a city in 1852. It was named for John Lynch, who inherited land here and in 1757 established a ferry across the James River. During the War of Secession Lynchburg was a base of supplies of some consequence for the Confederate army.

LYNCH LAW, a term originating in the United States and used to characterize capital punishment administered by mob violence without waiting upon the due processes of law. The origin of the phrase is said to be derived from the name of one Charles Lynch, a Virginia planter, who exceeded the limit of his power in punishing offenders, but this method of dealing with lawbreakers achieved greatest notoriety in the West during the pioneer days when civilization was years ahead of government. In California, particularly, following the discovery of gold, law-abiding citizens were forced to form *vigilance committees* to deal promptly with daring offenders against the peace of a community. The hanging of a man convicted by a group of citizens was called *lynching*. To-day the quick and orderly processes of the courts have deprived enraged citizens of all possible excuse for "lynch law," and public sentiment is sternly opposed to this method of punishment. In spite of this fact, however, an average of twenty-five lynchings occur every year; the victims are principally negroes. It is often difficult to secure the arrest and conviction of those involved in executing mob law, owing to local feeling against the victims.

LYNN, Mass., a leading center of shoe manufacture and an Atlantic seaport, located in Essex County, on Massachusetts Bay, ten miles northeast of Boston. It is served by the Boston & Maine and the Boston, Revere Beach & Lynn railroads, and by electric interurban lines. In 1910 the population was 89,336; in 1916 it was 102,425 (Federal estimate). Lynn has an area of eleven square miles, and extends for three miles along a splendid beach. The business section is on the lower ground about the harbor, the residence section occupying higher areas overlooking the bay. Interesting features of the city are an ocean boulevard, a state bathhouse, Lynn Woods (a beautiful park of 2,000 acres), Forest Park, Floating Bridge, a soldiers' monument, a handsome city hall, two hospitals and a public library.

There are large manufactories of boots and shoes (in which Lynn leads the world), morocco and leather, shoe manufacturers' supplies, electrical appliances, machinery, foundry and machine-shop products, boxes and patent medicines, their total annual production exceeding $75,000,000 in value. The making of boots and shoes began here in 1750. More than 20,000 persons are engaged in this industry, and the value of its annual output exceeds $50,000,000.

Lynn was settled in 1629 and was known as Saugus until 1637, when the present name was adopted from King's Lynn, England, the home of Rev. Samuel Whiting, pastor at Lynn from 1636 until his death in 1670. Lynn was incorporated as a city in 1850. A number of vil-

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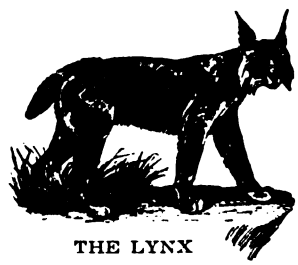
lages have been separated from Lynn, some of which have become fashionable summer resorts. The city adopted the commission form of government in 1910.

LYNX, *lingks,* the name of a group of the cat family, found in the northern parts of both hemispheres. A smaller species, known as the *bobcat,* is found as far south as Mexico. True lynxes are smaller than leopards and larger than ordinary wildcats. The fur, which grows even on the cheeks, is light brown or gray and very long and silky; sometimes it is spotted or striped with a darker shade. Lynxes have stumpy tails, and the pointed ears are tipped with tufts of fur. The pupils of the eyes contract to a narrow, black slit. These animals live in forests or in rocky places, and prowl at night. They kill sheep and chickens, but almost pay for them by the number of mice, rats and ferrets they destroy. They sleep in hollow trees or caves, but like to climb trees and lie stretched out on a limb. Young lynxes look like kittens, and the mother lynx will fight angrily and very cleverly against anything that approaches them. The beautiful fur is much in demand; because of this, and because of their raids on chickens and sheep, lynxes are being exterminated.


THE LYNX

These animals have been known by this name for hundreds of years. In Greek and Roman legends they were said to be able to see through the thickest walls, and the car of Bacchus, the wine god, was drawn by two huge lynxes.

LYON, *li'un,* MARY (1797-1849), the founder of Mount Holyoke College, which was the first of the various women's colleges now maintained in the United States. She was born near Buckland, Mass., and at the age of seventeen began teaching in a common school for seventy-five cents a week "with board." Three years later she entered Sanderson Academy, continuing her studies in various schools for several years and teaching part of the time. In 1828 Miss Zilpah P. Grant, one of her former teachers, organized a seminary at Ipswich, Mass., choosing Mary Lyon as her associate. Six years later, when Ipswich Seminary failed in its efforts to secure an endowment, Miss Lyon started out to establish an institution which would offer a thorough education to young women of moderate means. Mount Holyoke College, with its advanced ideals, founded in 1837, was the result, and as its principal for twelve years, she did pioneer work in education which made her one of the famous women of the United States. In recognition of her services to American education she was in 1905 elected to the Hall of Fame (which see). See COLLEGE, subhead *Colleges for Women.*

LYONS, *li'unz,* a great industrial city in the south of France, about fifty miles west of Lake Geneva, built upon a narrow, hilly strip of land between the Rhone and Saone rivers. It presents the unusual aspect of a modern manufacturing city and a medieval town. Along the river banks are busy docks and warehouses, for Lyons has the greatest silk industry in the world and has a large trade in coal, charcoal, metal and metal goods, wine, spirits, cheese and chestnuts. On the hill of La Fourviere are the chapels, churches and monasteries of the Lyons that was the medieval center of Christianity in the West. Here is the fifteenth century cathedral of Saint Jean; the Church of Saint Martin d'Ainay, which dates back to the ninth century; the Gothic church of Saint Nizier and the Hotel Dieu, that has never closed its doors to the poor since it was founded in the sixth century by Childibert.

Lyons was founded about 500 B.C. by Greek refugees. Under the Roman emperors it became a city of great wealth and importance, having fine temples, theaters, baths and aqueducts. In 478 Lyons was the capital of Burgundy; afterwards it fell into the hands of the Franks, and then the Saracens captured it. Charlemagne rescued it, then in the eleventh and twelfth centuries it became so prosperous that the neighboring cities began to quarrel about it, and the frightened citizens joined France for protection. During the Huguenot troubles, Lyons was mainly Catholic and suffered little harm, but in the French Revolution it was nearly destroyed. Fortunately the Germans did not injure Lyons in the Franco-German War, nor did the city suffer in the great War of the Nations which began in 1914. It has become the third in size and first in industry and manufacture of the cities of France. Population in 1911, 523,796.

LYRE, *lire,* a musical instrument of great antiquity, which originally had three strings. It consisted of a hollow body from which two

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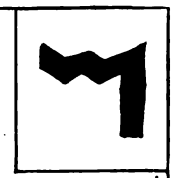
Mm



M is the thirteenth letter of the English alphabet. It is an interesting letter, because it has come down from the Phoenician with so little change in form or sound. The name of the original letter was *mem,* which meant *water,* and the character was a wavy line, which represented water in motion. The Greeks and Romans gave to the *m* the same value as the Phoenicians, and all through the centuries the letter has been singularly free from confusion with other letters, from which so many of the consonants have suffered. *M* is a liquid, or semivowel, and has only one sound. In a few foreign words, such as *mnemonic,* it is silent.

M is very commonly used as a symbol to mean *one thousand.* As an abbreviation it may stand for *mile* or *meter,* although the former is usually written *mi.*

MAARTENS, *mahr'tenz,* MAARTEN (1858-1915), the pen name of J. M. W. VAN DER POORTEN-SCHWARTZ, a Dutch novelist whose writings give an accurate picture of middle-class life in his native country. He was born in Amsterdam, but spent his early boyhood in England. Later he was educated in the public schools of Germany, and he also studied law at the University of Utrecht. Strangely enough, Maartens wrote his novels in English rather than in his native tongue; and only because he did not wish to trust his books to strange translators did he at any time consent to having them published in Dutch. All of his works have been successful and popular. *The Sin of Joost Avelingh,* his first novel, was published in 1889. Among the others are *An Old Maid's Love, A Question of Taste, God's Fool, The Greater Glory, Harmen Pöls, Price of Lis Doris* and *Eve.* Maartens died August 4, 1915.

MABIE, *ma'be,* HAMILTON WRIGHT (1846-1917), an American editor, essayist and lecturer who has been a potent force in behalf of culture and character forming. His death marked the close of thirty-seven years of editorial connection with *The Outlook,* thirty-two of which he spent as assistant editor of that periodical. He was born in Cold Spring, N. Y., and was educated at Williams College and the law school of Columbia University. In 1879 he joined the staff of *The Christian Union* (later *The Outlook*), and in the years that followed he contributed to that journal hundreds of literary reviews and talks on social and ethical subjects. He also became widely known as a lecturer, especially as a speaker before audiences of college men and women. As an American exchange professor in Japan he did much to strengthen the friendship between the two countries. Mr. Mabie is perhaps most widely known as an interpreter of literature and of the spiritual life, but he has published some excellent books for young readers. These include *Myths Every Child Should Know, Fairy Tales Every Child Should Know* and *Legends Every Child Should Know.* Among his other writings are *My Study Fire; Essays in Literary Interpretation; Nature and Culture; American Ideals, Character and Life;* and *Japan, To-day and To-morrow.*

MACADAM, *ma kad'am.* See ROADS AND STREETS.

McALESTER, *ma kal'es ter,* OKLA., the county seat of Pittsburg County, is situated in the southeastern part of the state, at the junction of the Missouri, Kansas & Texas and the Chicago, Rock Island & Pacific railways. Oklahoma City is 120 miles northwest, and

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Fort Worth, Tex., is 191 miles southwest. The first settlement was made in 1872, and was named for J. J. McAlester, its founder. The cities of McAlester and South McAlester were consolidated and incorporated as McAlester in 1907; the commission form of government was adopted in 1910. From 12,954, in 1910, the population increased to 18,504 in 1916 (Federal estimate). The area is five and a half square miles.

The region in which McAlester is located is a rich farming and stock-raising country. Immense deposits of coal are found near by, and coal-mining and coke-making are the principal industries. The city has a large wholesale and jobbing business, especially in hardware and groceries. Among the notable buildings are the state penitentiary, the Federal building, erected in 1915, the Masonic Temple and the Carnegie Library.

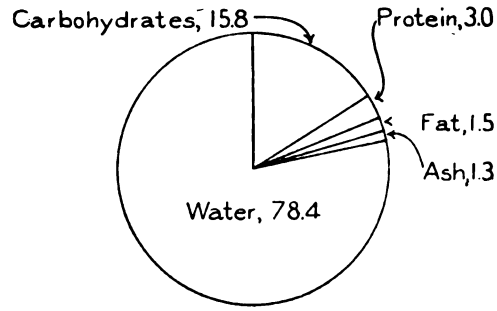
MACARONI, *mak a ro' ni,* an article of food composed of paste or dough made from the best qualities of a hard variety of wheat containing a large percentage of gluten. It was formerly an exclusive product of Italy, but is

DRYING MACARONI IN NAPLES

In Italy such a scene as the above is common. The macaroni eaten in America is nearly all of home manufacture, under proper sanitary conditions.

now also made in France and in America. The wheat is first ground into a coarse meal, from which the bran is removed, after which it is mixed with hot water and worked up into a dough. In this state it is called Italian paste. It is then placed in a vertical brass cylinder perforated with holes, the size of which regulates the size of the macaroni tube. The dough is forced through these holes by hydraulic pressure, cut off into lengths of about three feet and dried in the sun or by low heat. This modern and sanitary method of making macaroni has replaced the former laborious hand process. Italian paste is also made into a threadlike product called *vermicelli,* and into larger cords known as *spaghetti.*

Macaroni is an important article of food in Italy, especially in Naples and Genoa, and it is exported from that country in large quantities to all parts of the world. Over 500,000 boxes are sent annually to the United States,



COMPOSITION OF MACARONI

Its fuel value is only about 400 calories per pound, when ready for the table, ranking below the poorest parts of beef and pork, nearly equal to bananas, but much above tomatoes and pumpkins.

and about 70,000 to London. As macaroni is rich in starch, it should not be served with potatoes. A favorite way of cooking it is by first boiling, then sprinkling with cheese, and baking; in this form it is known as *macaroni au gratin.* S.L.A.

MACAULAY, *ma kaw' li,* THOMAS BABINGTON (1800-1859), an English statesman and author, born at Rothley Temple, Leicestershire. He was a very remarkable child, for he read easily at the age of three, and from the age of seven busied himself writing history and poetry. By means of his extensive reading and a course in a private school, he was prepared to enter Cambridge in 1818 and to win distinction as a writer and a debater. In 1824 he was made a fellow of Trinity College. The next year he studied law, and in 1826 was called to the bar, but did not practice long before giving up this vocation because of his decided leaning to literature. During his college days he had published a number

THOMAS B. MACAULAY

His command of expression was proportioned to the extraordinary compass of his memory.

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of poems and essays, and in 1825 had contributed to the Edinburgh *Review* his essay on Milton, which had been received with enthusiastic praise. Thus his literary career opened with most promising prospects, and his popularity kept on increasing until his death. The essay on Milton was followed by a long series of magazine articles, on a variety of subjects, and Macauley became the most widely read essayist of the age.

In 1830 he entered Parliament, became prominent as an ardent Whig and eloquent debater, and helped in securing the passage of the great Reform Bill in 1832, abolishing the so-called "rotten boroughs." After a period of absence in India as a member of the supreme council there, he was again returned to Parliament, where he served at intervals during nearly all the remainder of his life. In 1842 was published his *Lays of Ancient Rome,* a book of ballads based on Roman legends and remarkable for their vigorous, swinging meter. *Horatius at the Bridge,* one of the *Lays,* is known and liked by almost every schoolboy. Six years later were issued the first two volumes of his greatest work, *The History of England from the Accession of James II.* The effect produced by these books was unique. They were welcomed not only by scholars but by the entire reading public, who found in them the entertaining style and the thrilling narrative which they expected only from novels. The history sold by the thousands, not only in Great Britain but in the United States. The third and fourth books were even more eagerly received, and it is said that in the United States the sale of copies was exceeded only by that of the Bible. There have been few authors who have enjoyed such popularity during their lifetime. In 1857 Queen Victoria recognized his ability and his services by creating him Baron Macaulay of Rothley. Two years later, after a long period of ill health, he died suddenly, leaving his great history unfinished.

Macaulay's style is regarded as a model of clearness and grace. It has had many imitators, but no one of them has approached the original. In value of content, however, his essays and histories do not compare with those of accurate and philosophical present-day writers. His love for vividness and picturesqueness in his presentation led him into a coloring of facts, and his Whig tendencies were so pronounced that he often did injustice to other parties. Nevertheless he must always be remarkable for his great breadth of learning and for his ability to gain and hold the interest of his readers. A.MC C.

Consult McMaster's "Thomas Babington Macaulay," in *Warner Classics.*

MACAW, *ma kaw',* one of a species of large, gorgeous, strong-flying parrots, mostly found in South America, although a few reach as far north as lower Central America. Among the best-known species are the *great scarlet macaw,* the *red* and *yellow, green-winged macaw* and the *green macaw.* The distinctive features of this bird are long, pointed wings, naked cheeks, a short, arched bill and a very long, wedge-shaped tail. They are easily domesticated, but as their natural notes are harsh and piercing, and they do not learn to use words readily, and cannot be taught not to scream, they make undesirable pets.

MACAW

Macaws are usually seen in pairs, flying and feeding close together. Their eggs, which seldom exceed two in number, are laid in the hollows of trees; they feed chiefly on seeds and fruits and sometimes cause great damage in fields of grain. When domesticated, they readily eat bread and sugar.

MACBETH, *mak beth'* (? -1057), a king of Scotland whose seventeen years' reign is chronicled as a time of plenty. In a revolt in 1040, Macbeth slew Duncan, then the Scottish king, and seized the throne. Duncan's sons at once fled to England, and in 1054, with their Uncle Siward, Earl of Northumbria, led an army into Scotland against Macbeth. An indecisive battle was fought near Scone; it was not until 1057 that Macbeth was finally defeated and slain at Lumphanan, in Aberdeenshire.

The Tragedy, "Macbeth." Shakespeare, using as a basis one of the stories in Holinshed's *Chronicles of England, Scotland and Ireland,* and investing the tale of Macbeth and Duncan with the glow of imagination, produced in the tragedy Macbeth one of the greatest plays of all time. This drama is historical only in that it is founded on the murder of King Duncan by Macbeth. It is due to the poet's genius that we read in this masterpiece of dramatic writing the story of a soul's degradation; it is

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a tragedy of life, a picture of the downfall of one who yielded to the voice of over-reaching ambition. From the meeting of Macbeth and the witches on the lonely heath, in the first act, an element of the supernatural pervades the play. The witches are symbols of evil suggestion, for they stimulate in Macbeth the lust for power that is to ruin him, and it is from them that he receives the suggestion that Banquo stands as an obstacle in his path. The subsequent murder of Banquo and the appearance of his ghost at the feast mark the climax of the play. Macbeth has given himself over entirely to the forces of evil, but from this point on he pays the price of his crimes.

Probably the spiritual struggle of Lady Macbeth holds as much interest for the reader as that of her husband. She shows greater strength of purpose in the beginning than he; it is to her that Shakespeare gives the oft-quoted lines—

> We fail!
> But screw your courage to the sticking-place,
> And we'll not fail.

Yet she seems to have possessed the finer nature, for her mind gives way under the burden of her guilty secret, and in the pathetic sleep-walking scene she cries despairingly—

> Out, damned spot! out, I say! * * * * *
> What, will these hands ne'er be clean?
> * * * * * Here's the smell of the blood still: all the perfumes of Arabia will not sweeten this little hand.

Shakespeare is supposed to have written the play in 1606. It first appeared in print in the folio of 1623. The rôles of Macbeth and Lady Macbeth have been portrayed by some of the greatest actors. R.D.M.

McBRIDE, SIR RICHARD (1870-), a Canadian barrister and statesman, for twelve years premier of British Columbia. Sir Richard is one of the men who have played a leading part in the development of the Pacific province. Political opponents have found fault with his policies and his occasional arbitrary actions, but even they admit the progress made by British Columbia between 1903 and 1915, the years during which he was in control. Economic development of the province, especially through financial assistance to railways, was one of his cardinal principles.

McBride was born at New Westminster, B. C., attended the public schools of that city, and later attended Dalhousie University, at Halifax, N. S. He was called to the bar in 1892, and for six years practiced his profession at Victoria, B. C. Entering the provincial legislative assembly in 1898 as a Conservative, he quickly won a high place in political life. In 1900 he assumed the position of minister of mines in the Dunsmuir administration, but resigned after a year because of a disagreement with his chief. In 1902 the Conservatives chose him to lead them in opposition, and in 1903 he was appointed provincial premier and minister of mines. During the next twelve years occasional reorganizations of the ministry were necessary, but McBride succeeded in maintaining his leadership. It was generally assumed that he would continue indefinitely in active politics, but in 1915 he resigned the premiership, and temporarily, at least, withdrew from politics to become provincial commissioner to Great Britain, with headquarters at London.

MACCABEES, *mak'a beez,* a Jewish dynasty of heroes who were credited with being the deliverers of Judea and Judaism from the persecutions of the Syrian king, Antiochus Epiphanes. The original name of the family was *Hasmoneans.* It consisted of the aged Matthias and his five sons, who led a rebellion against the oppressing Syrians, conquered and killed many of their tribes and destroyed their pagan altars. Matthias died in 167 B. C., and was succeeded by his son Judas, to whom alone, according to the Scriptures, properly belongs the surname *Maccabaeus,* and who by his heroism and loyalty to the faith of his fathers was responsible for this illustrious period of Jewish history. The fraternal order, the *Maccabees of the World* (which see), was named for this dynasty.

MACCABEES OF THE WORLD, KNIGHTS OF, a fraternal and benevolent society to which all white male persons of sound health and good character, between the ages of eighteen and seventy, are eligible. Its name was derived from the Biblical Maccabees (see MACCABEES). The order was founded at London, Ontario, in 1878 and reorganized in 1883. Its headquarters, known as the Supreme Tent, are now located at Port Huron, Mich. Between the meetings of the governing body, which take place once in three years, the affairs of the society are administered by a board of seven trustees. The purpose of the order is to provide social and fraternal intercourse among its members and benefits in the way of insurance to the families of deceased members. Since its organization the society has disbursed over $53,000,000 in benefits. The membership in September, 1916, was 316,575. Prior to 1904 the association was known as *The Knights of the Maccabees.*

McCARTHY, *ma kar'thi,* JUSTIN (1830-1912), a writer, lecturer and statesman, whose literary

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productions are concerned chiefly with the England of his own day. He was born in Cork, Ireland; became a reporter on the Cork *Examiner* in 1847, then found his way to London, the land of promise of every journalist, and became successively Parliamentary reporter, leader writer and editor. His novel, *Dear Lady Disdain,* published in 1871, met with great success. Into this novel, as well as *Mononia* and *My Enemy's Daughter,* he put a good deal of his early life and its local associations. His unadorned English is warm with human sympathy, persuasive in narrative and full of subtle humor. He was prominent as a member of Parliament, and led the Home Rule party after Parnell's overthrow. In *The Ladies' Gallery* and *The Right Honorable* he developed his plots against a background of Parliamentary life. His crowning success in the field of literature is *A History of Our Own Times,* appearing in successive volumes. It became popular in America as well as in England, and is his literary monument. His other historical works are *History of the Four Georges* and *The French Revolution.* His novels include *Miss Misanthrope, A Fair Saxon, Lady Judith, The Maid of Athens* and *Paul Massie.* The *Story of Gladstone's Life* is one of his best-known biographies.

McCLELLAN, *ma klel'an,* GEORGE BRINTON (1826-1885), a leading general with the Union forces during the early part of the War of Secession, and one of the few great military men who sought the Presidency unsuccessfully. He was born at Philadelphia, December 3, 1826, was graduated from West Point in 1846, and served as an engineer in the Mexican War; for splendid service in that struggle he was appointed a captain. After the war the government commissioned him to make extensive surveys in the West for a proposed Pacific railroad, and in 1855 sent him to Europe to study the organization of armies. For three years he held offices as vice-president of the Illinois Central Railroad and general superintendent and president of the Ohio & Mississippi's eastern division.

GEORGE B. McCLELLAN

At the beginning of the War of Secession McClellan was appointed major-general. As a military leader and organizer he was remarkably successful, but his lack of aggressiveness and slowness of movement were sharply criticized, and when, after the battle with General Lee at Antietam, Md. (see ANTIETAM, BATTLE OF), McClellan failed to follow up the enemy, his command was taken from him. In 1864 as Democratic candidate for President against Lincoln he was defeated. Thirteen years later McClellan served one term as governor of New Jersey. Among other works, he wrote the *Manual of Bayonet Exercise* and *Report on the Organization and Campaigns of the Army of the Potomac.*

McCLURE, *ma kloor',* SAMUEL SIDNEY (1857-), an American editor and publisher, founder of the publishing house and newspaper syndicate that bears his name. He was born in Frocess, County Antrim, Ireland, and emigrated to America with his parents in childhood, settling in Illinois. In 1882 he was graduated from Knox College, and edited the *Wheelman,* for bicyclists, in Boston until 1884. In that year he established the McClure Syndicate in New York, the first organization of its kind to adopt the system of buying manuscripts from authors and selling them for simultaneous publication in various newspapers. He began the publication of *McClure's Magazine* in 1893, and under his editorship it soon reached the front rank among American periodicals.

In 1899 he established the publishing house of McClure, Phillips & Company, the partnership ending when Doubleday, Page & Company acquired the book business, and the McClure Syndicate took over the magazine. The S. S. McClure Newspaper Corporation was formed in 1915, when the New York *Mail,* of which Mr. McClure became editor, was purchased. He has been a trustee of Knox College, Galesburg, Ill., since 1894. He was for a time at the head of the Montessori Association, formed for the purpose of introducing the Montessori system of child training into the United States, and it was largely due to him that Madame Montessori engaged in her American lecture tour of 1913-1914. A frank and interesting story of the publisher's life, from his own pen, appeared in serial form in his magazine in 1915.

McCORMACK, *ma kor'mak,* JOHN (1885-), an Irish tenor who has acquired fame in concert tours in Europe, America and Australia. He was born in Athlone Westmeath. It was

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not until after he had completed his college education that he learned he was gifted with a voice of unusual quality. One eventful day he won first prize at a Dublin musical festival, and then he awakened to a realization of the possible career before him. The success of a few concerts enabled him to begin his studies in Italy. Later he appeared in concerts in many Italian cities. Returning to London in 1907, he made his debut at Covent Garden, where he scored a triumph with Mme. Tetrazzini in *Rigoletto*. He has since appeared in leading rôles in many noted operas, and has also won fame in Irish songs.

JOHN McCORMACK

McCORMICK, *ma kor' mik,* CYRUS HALL (1809-1884), an American whose genius developed the first of the great labor-saving machines which gave cereal growing a remarkable impetus. It has been said that owing to the invention of the reaping machine, which he produced in 1831, the line of civilization moved westward thirty miles each year. He was born in Walnut Grove, Va., and the small country school was the only formal educational advantage he ever enjoyed. In 1845 he removed to Cincinnati, and two years later to Chicago, where extensive works for building his reapers were established. By that time the machines were being sent to all parts of the world.

CYRUS H. McCORMICK

The McCormick factories perfected the reaping machine step by step, keeping pace with the active competition which inevitably developed, and in 1902 they were included in the consolidation of leading reaping and binding machine companies which became known as the International Harvester Company.

Many prizes and medals were awarded this pioneer inventor, and the French Academy of Science made him a member when he was nearly seventy years old. He founded the McCormick Theological Seminary of the Presbyterian Church in Chicago, endowed a professorship in Washington and Lee University and gave liberally to charitable and religious institutions. See REAPING MACHINE; INVENTION.

McCUTCHEON, *ma kutch' en,* GEORGE BARR (1866-), a popular American author whose stories, most of them adventurous romances, have been among the most widely read volumes of modern American fiction. He comes of a talented family, and was born and spent his boyhood on a farm in Tippecanoe County, Ind.; his brother John is a famed cartoonist (see below). After attending Purdue University, he became, in 1889, a reporter on the Lafayette *Journal,* and four years later was made city editor of the Lafayette *Courier*. Between the years 1901 and 1913 he published more than twenty books, all of which had an immense sale. Among them are *Graustark, Castle Craneycrow, Brewster's Millions, Nedra, The Purple Parasol, Cowardice Court, Truxton King, The Rose in the Ring, Mary Midthorne, A Fool and His Money, The Prince of Graustark* and *Mr. Bingle*. He has also contributed a number of short stories to magazines.

McCUTCHEON, JOHN TINNEY (1870-), an American newspaper artist and correspondent, famous as a cartoonist for the Chicago *Tribune* since 1903. Earlier in his career he was employed by the Chicago *Record* and the Chicago *Record-Herald*. His work is very popular, and his cartoons have been called "pen-and-ink sermons." He takes his topics mainly from the commonplace incidents of life, instead of portraying solely political issues and unkindly caricaturing public men. He has the rare genius of aiming his cartoons at human foibles and weaknesses. His popular series of *Bird Centre* cartoons added much to his fame as a caricaturist of human nature. His cartoon, *Indian Summer,* was so well received that it has been reprinted in the *Tribune* several times by request. Among his most famous sketches are *The Cartoons That Made Prince Henry Famous*. Mr. McCutcheon was sent to Europe as war correspondent for the *Tribune* in 1914 and again in 1915. In 1917 he purchased a small island among the Bahamas, named Salt Cay, realizing in this transaction a boyhood dream. Early in the same year he married Miss Evelyn Shaw, of Chicago. He is a brother of George Barr McCutcheon (see above).

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MACDON'ALD, George (1824-1905), a Scottish poet and novelist, called "the apostle of the spiritual meaning of life." He was the author of a long list of novels, notably *David Elginbrod, The Seaboard Parish, Robert Falconer, Malcolm* and *What's Mine is Mine,* in all of which the story interest is secondary to the spiritual element. He also published several books of verse, and was particularly successful in his stories for children, of which *The Princess and the Goblin, Dealings with Fairies* and *At the Back of the North Wind* rank with the best ever written. Macdonald was born at Huntley, Aberdeenshire, and was educated at Aberdeen University. Later he studied for the ministry, but on account of ill-health gave up the idea of becoming a preacher. His novels, which are full of the quaint dialect of the people of Aberdeenshire and the Northeastern counties, show his deep insight into Scottish character. In 1872 he lectured in the United States and Canada.

MACDONALD, Sir Hugh John (1850-), a Canadian barrister and statesman, son of Sir John A. Macdonald, the first premier of the Dominion. The son was educated at Queen's College, Kingston, and at Toronto University, from which he was graduated at the age of nineteen. He then studied law, was called to the bar, and practiced law in Toronto from 1872 to 1882, when he removed to Winnipeg. There he began to take part in public affairs, and in 1891 was elected as Conservative to the Dominion House of Commons. In 1896, during the brief service of the Tupper Ministry, Sir Hugh was Minister of the Interior. Later he was chosen leader of the Manitoba Conservatives, and in 1899-1900 was premier of the province. His term of office was not an eventful one, and in 1900 he resigned in order to reënter Dominion politics. He was, however, defeated for election to the House of Commons, and returned to his law practice. Nevertheless he maintained his interest in politics, and continued to stand high in the Conservative ranks, and at least on one occasion led the party in a general election in which defeat was a foregone conclusion. On December 12, 1911, Sir Hugh was appointed a police magistrate of Winnipeg.

MACDONALD, James Alexander (1862-), a Canadian clergyman, editor and publicist, for many years known as the editor of the Toronto *Globe,* which he made one of the most powerful journals in Canada, but in recent years conspicuous as an advocate of arbitration in international disputes. Not merely with the pen but with the tongue Dr. Macdonald spread his views until he became one of the most famous religious and political speakers in America.

Macdonald was born in Middlesex County, Ontario, and was educated at Edinburgh University and at Knox College, Toronto. In 1891 he was ordained a Presbyterian minister, and in the same year became pastor of a church at Saint Thomas, Ont. After five years he removed to Toronto, to become editor of the *Westminster,* a monthly journal of a religious character. He afterward served as editor of the *Presbyterian,* a weekly paper. At the same time, from 1896 to 1901, he was principal of the Presbyterian Ladies' College. In 1902 he assumed the editorial direction of the Toronto *Globe,* through which he became one of the best known and most influential molders of public opinion in Canada. He continued his activity along religious lines and served as a member of the committee on union of the Presbyterian, Methodist and Congregational churches of Canada. After 1911, and more especially after 1915, when he resigned as editor of the *Globe,* Dr. Macdonald gave much of his time to lecturing and writing about international peace, both in Canada and the United States, and quite aside from the fact that after 1911 he was a director of the World's Peace Foundation, was without question the foremost Canadian advocate of arbitration.

MACDONALD, Sir John Alexander (1815-1891), a Canadian statesman, the first Premier of the Dominion and for a generation the dominant figure in Canadian public life. The career of Sir John Macdonald cannot be studied apart from the history of Canada. He was in some respects the typical Canadian public man of his day—ambitious, energetic, independent, occasionally forgetful of the methods he adopted to secure legitimate needs. What is looked upon as the greatest mistake in his career is the Pacific railway scandal, yet even in this case he did not personally profit. Allowance should be

SIR JOHN A. MacDONALD

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made, too, for the many difficulties he had to meet. Few political leaders of any age have had so many opposing elements to reconcile, so many factions to hold together. The man who could rule a mixture of zealous factions, including "Irish Catholics and Orangemen, French and English antifederationists and agitators for independence, Conservatives and reformers, careful economists and prodigal expansionists," was manifestly a man of unusual power.

Sir John was a consummate leader, a man of great personal magnetism and striking physical appearance. In features he greatly resembled Benjamin Disraeli. He had a keen insight into the workings of the human mind, a gift which he utilized to secure personal popularity among the mass of the people as well as the leadership of any group in which he worked. In the old Canadian assembly and its successor, the Dominion Parliament, he held a unique place, which is perhaps sufficiently indicated by the fact that his first service as Premier of Canada began in 1857, and his last continued until his death in 1891.

Youth and Early Career. Macdonald was born in Glasgow, Scotland, on January 11, 1815. When he was five years old his parents took him with them to Canada. They settled at Kingston, Ont., where their son spent his boyhood, studied law and in 1836 was called to the bar. He practiced at Kingston until 1844, when he was elected to the assembly as a Conservative. In a sentence of his first public address he struck the keynote of his career: "I therefore need scarcely state my firm belief that the prosperity of Canada depends upon its permanent connection with the mother country, and that I shall resist to the utmost any attempt (from whatever quarter it may come) which may tend to weaken that union."

During his first years in the assembly his voice was heard infrequently. He devoted most of his time to perfecting his knowledge of parliamentary practice, and no less important, to a study of the men with whom he was now brought into contact. As a result he became perhaps the most skilful party manager and the ablest parliamentarian in the history of Canadian politics. His speeches were infrequent, but his abilities won prompt recognition, and in 1847 he acted as receiver-general and later as commissioner of crown lands. From 1848 to 1854 the Conservatives were in opposition, but in the latter year Macdonald again took office as attorney-general in the Cabinet formed by Sir Allen MacNab and Auguste Morin. As attorney-general it fell to Macdonald to dispose of two vexing problems, clergy reserves and seigniorial tenures, which had long been important. During these years Macdonald recognized and accepted three principles which thereafter guided his policy—first, the maintenance of Canadian union with Great Britain; second, a tariff for the protection of domestic industries; and, third, a union of the British colonies in North America. The union of the colonies was established to a considerable degree through Macdonald's influence, and the other two principles still guide Canadian statesmen.

A Decade of Preparation, 1857 to 1867. Until 1857 Macdonald held only subordinate Cabinet positions, although in several Ministries, notably that formed by Sir Etienne Taché in 1856, he was the real head of the government. Between 1857 and 1867 Macdonald was several times Premier, first jointly with Sir Georges Cartier, and later again with Taché. During this period British Columbia became (1858) a crown colony, Ottawa was chosen (1858) as the capital of Canada, the decimal system of currency was adopted (1858), the famous Victoria bridge at Montreal was completed (1860), and the Trent affair (1861) and the Fenian invasion (1866) caused great excitement.

Far more important than any of these events was the growing consciousness among Canadians that the legislative union of the two Canadas could last no longer. The alternative was Confederation, the union of all the British colonies in North America. The Fenian Raid, the Trent episode, the lesson of unity learned from the War of Secession in the United States, added to the impossibility of securing effective government under the Act of Union, turned the thoughts of statesmen to a larger Canada.

At last in 1864, after the Taché-Macdonald Ministry was again defeated, a coalition Ministry was formed with a view to securing a union of the provinces. For this coalition the chief credit is due to George Brown, the Liberal leader, who renounced the strongest personal dislike of Macdonald and accepted a place in the Ministry. Macdonald, Brown and Cartier were sent as delegates to the Charlottetown Conference in 1864, the result of which was the Quebec Conference, a month later. The most prominent figure in the conference was unquestionably Macdonald, who became, three years later, the first Premier of the new Dominion of Canada.

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Organization and Expansion. The difficulties of organizing the Dominion called for infinite tact and resource on the part of Macdonald. The jealousies of the provinces had to be smoothed over, yet the rights of the new Dominion had to be maintained. Sir John (he was created Knight Commander of the Order of the Bath in 1867) was strongly in favor of the aggressive assertion of the rights of the new Dominion, but in the principal legal battle, the Ontario-Manitoba boundary question, which this position caused, he was defeated. The North West Territories were secured by purchase of the Hudson's Bay Company's territorial rights, and Manitoba was organized as a province. Sir John went to Washington, D. C., in 1870 as one of the commissioners to settle the Alabama case and the fisheries dispute, and was one of the signers of the Treaty of Washington in 1871. The construction of the Canadian Pacific Railway, which was one of the most important projects in which the government was concerned, cost Sir John the Premiership in 1873, when it was learned that the Conservative party had accepted money from the railway's promoters for use in election campaigns. Public indignation compelled Sir John's resignation, although it was known that he had not personally profited.

During the next five years Canada, like the United States, suffered from severe industrial depression. The Conservatives seized the opportunity of the elections of 1878 to offer a protective tariff as the first remedy for depression. Their "national policy," as it was popularly called, won the voters' approval, with the result that Sir John again became Premier and served until his death in 1891. During these years the record of Sir John's life is practically the history of Canada. Most of his efforts were directed to the organization and development of the great Northwest. He immediately took up again the question of a transcontinental railway, and discarding the Liberal policy of government construction, contracted with a syndicate of capitalists to complete the work. The Canadian Pacific Railway was completed in November, 1885. In the same year occurred the Saskatchewan or North West Rebellion, which was the direct result of westward expansion (see SASKATCHEWAN REBELLION). Sir John's last public appeal, in the elections of 1891, was to the voters to defeat the proposed Liberal program of trade reciprocity with the United States. The excitement and anxiety of the contest brought on a stroke of paralysis, which caused his death, on June 6, 1891. His widow was created Baroness Macdonald of Earnscliffe, Earnscliffe Hall being the name of the Macdonald home in Ottawa. G.H.L.

Consult Pope's *Memoirs of Sir John Alexander Macdonald;* Parkin's *Sir John A. Macdonald,* in The Makers of Canada Series; Biggar's *Anecdotal Life of Sir John Macdonald.*

MACDONALD, JOHN SANDFIELD (1812-1872), a Canadian statesman, Premier of Canada from 1862 to 1864, and from 1867 to 1871 first premier of the province of Ontario, a man who is conspicuous in Canadian history for his independence of party ties. Even as a boy he displayed his independence by running away from home on more than one occasion when parental discipline seemed to him unjust or too stern. For a number of years he worked as a clerk in a store at Cornwall, Ont., but being dissatisfied with his prospects there, began the study of law. He was called to the bar in 1840, and a year later began his public career as a member of the Canadian assembly. He became the leader of the reform party, but his party allegiance was uncertain when mere names were at stake. Though originally elected as a Conservative, he was solicitor-general for Upper Canada in the Liberal Baldwin-Lafontaine Ministry from 1849 to 1851, and in 1858 again accepted a place (attorney-general) in the Liberal Brown-Dorion Ministry. From 1852 to 1854 he was speaker of the assembly.

On most public issues Macdonald was a Liberal, but he was one of the few Upper Canadians who opposed "representation by population," one of the Liberal planks for a generation. On many occasions he voted with the Tories, yet he never attended a Tory meeting or had intimate alliance with that party's leaders. Although a Roman Catholic, he was never an advocate of separate schools. From 1862 to 1864 he was Premier. His Ministry was not a strong one, and was succeeded by a Conservative one headed by Sir John A. Macdonald, who was not related to John Sandfield. The latter opposed Confederation, but after the passage of the British North America Act became its loyal supporter. In 1867 he was called on to organize the provincial government of Ontario. During his Ministry were established the provincial agricultural college and many of the other public institutions of the province. After four years, during which the government was operated efficiently and economically, Macdonald resigned the Premiership and retired from public life

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MACDONALD, Sir William Christopher (1831-), a Canadian capitalist and philanthropist, who endowed the Macdonald Agricultural College and Normal School and also gave liberally to other educational and charitable institutions. Sir William was born at Glenaladale, Prince Edward Island, and received his schooling at the Charlottetown Academy. In his twenty-third year he left Prince Edward Island and removed to Montreal, where he engaged in business and eventually amassed a large fortune. One of his largest donations—$5,400,000—was to McGill University, and the endowment for Macdonald Agricultural College, at Sainte Anne de Bellevue, Que., amounted to $5,000,000. He endowed the schools for manual training and domestic science in connection with Ontario Agricultural College, and also gave largely to the Victoria Hospital at Montreal, and to other charitable institutions. The honor of knighthood was conferred on him in 1898.

McDOUGALL, *mak doo'gal,* William (1822-1905), a Canadian statesman and journalist, prominent in the movement for Confederation, a member of the first Dominion Cabinet, and the first lieutenant-governor of the North West Territories and Rupert's Land. The acquisition of the Northwest by the Dominion government was a hobby of McDougall's, and it was fitting that he should have been chosen in 1869 as its first governor. On his arrival at the boundary of the Territories, on his way to Fort Garry, McDougall was turned back by the half-breeds under Louis Riel, who thus gave the signal for the Red River Rebellion (which see).

William McDougall was born at Toronto, Ont., studied at Victoria College, Cobourg, and was called to the bar in 1847. While still a law student he began to contribute to newspapers, and in the year he began to practice law, also founded a weekly paper, *The Canadian Farmer.* In 1850 he established *The North American,* a semiweekly paper of somewhat radical tendencies. *The North American* was absorbed in 1857 by the Toronto *Daily Globe,* for which McDougall continued to write until 1870. His work as a journalist won him a seat in the Canadian assembly in 1858. He was commissioner of crown lands from 1862 to 1864, then for three years was provincial secretary, and in 1865 and 1866 also served as chairman of a commission to develop Canadian trade with the West Indies and South America. McDougall was present both at the Charlottetown and Quebec conferences, and took a leading part in the discussions. After Confederation Sir John Macdonald chose him to be Minister of Public Works, but after a year sent him to England to negotiate with the Hudson's Bay Company for the purchase of the North West Territories. In 1871 he was one of the commissioners to settle the boundaries of Ontario, and in 1873 went to London on a special mission relating to Canadian fisheries. He continued to sit in the House of Commons until 1882, when he retired from public life.

MACDOWELL, *mak dou'el,* Edward Alexander (1861-1908), an American pianist and composer, whose art is representative of the best music that America has produced. He was born in New York City, and studied in Paris, Wiesbaden and Frankfort. Upon his return to America, in 1888, his compositions as well as his playing, which was always characterized by great poetic feeling, became very popular. His compositions have an atmosphere of the woods, and he had a happy faculty of introducing into them touches of American folk-music, notably Indian. He composed an *Indian Suite* for the orchestra, and the most popular of all his compositions for the piano, *Woodland Sketches,* likewise embraces Indian themes. He published nearly sixty works, which include almost 300 separate compositions. Important among these are the symphonic poems, *Hamlet and Ophelia, Lancelot and Elaine* and *Lamia,* and the sonatas *Norse* and *Keltic.* From 1896 to 1904 he was the head of the department of music at Columbia University; the year following his resignation his mind failed, and he died three years later.

McDOWELL, Irwin (1818-1885), an American soldier who played a prominent but somewhat unfortunate part during the War of Secession. He was born at Columbus, Ohio, received his education in France and at West Point, and during the Mexican War received the brevet rank of captain for gallantry at Buena Vista. Shortly after the outbreak of the War of Secession he was made brigadier general of volunteers in the Federal army and given command of the Army of the Potomac. A serious defeat in the first Battle of Bull Run, though due to no lack of skill on his part, told against him, and McClellan was given his command. Later he took part in the battles of Cedar Mountain, Rappahannock Station and Bull Run, but in September, 1862, was relieved from field duty. A court of inquiry investigated the charges and acquitted him fully.

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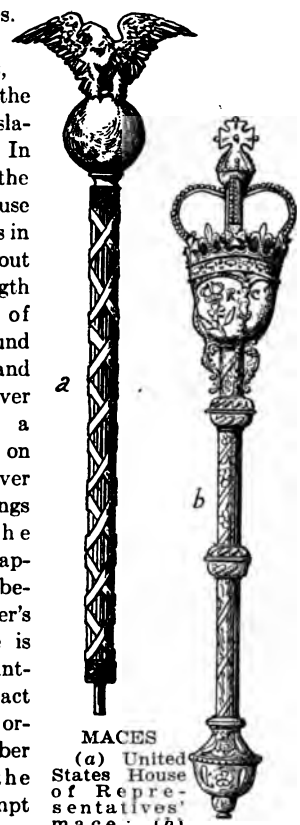
MACE, a club-shaped staff used as a symbol of authority. It was first known in early Roman days, when lictors bore *fasces,* or staffs, before magistrates. Its use was continued in councils, and it became the emblem of legislative authority. In the United States the mace in the House of Representatives in Washington is about three feet in length and consists of ebony rods bound together with a band of silver. A silver globe stands on a protruding rod, on which rests a silver eagle with wings outspread. If the legislative body appears at times beyond the Speaker's control the mace is lifted by a sergeant-at-arms and the act at once restores order. Any member disregarding the mace is in contempt and liable to censure and expulsion. See the article LICTOR, for illustration of *fasces.*



MACES (*a*) United States House of Representatives' mace; (*b*) the mace of the English House of Commons.

MACE, a highly-flavored spice obtained from the covering of the nutmeg, which is the seed kernel of a pear-shaped tropical fruit (see NUTMEG). When this fruit becomes ripe its fleshy halves open, exposing the mace-covered kernel. Fresh mace is somewhat fleshy and of a blood-red color, and in fragrance and flavor is similar to the nutmeg. To prepare the mace for the market the natives dry it in the sun, which makes it half transparent and orange-yellow in color. It is used as a flavoring, either whole or ground. Mace is grown chiefly in the Spice Islands (East Indies) and in the West Indies.

MACEDONIA, *mas e do' ni a,* or **MACEDON,** once the mightiest empire in the world, now only an unimportant division of territory in the heart of the Balkan Peninsula. For many years its people suffered cruelly at the hands of the Turks, but it was finally liberated in the Balkan War and divided between Serbia, Bulgaria and Greece, the last named getting the important seaport of Saloniki. In ancient times Macedonia was the name of the territory lying north of the Aegean Sea and Thessaly, east of Illyria and west of Thrace. The capital was Pella. Whether the Macedonians were of Greek origin is a matter of doubt. They were so different in manner and custom that it is now considered probable they were a distinct people.

Philip of Macedon, or Philip II, made Macedonia a powerful state soon after his accession in 359 B.C. Under Alexander the Great, the illustrious son of Philip, Macedonia reached its highest glory and spread until the empire embraced the countries now known as Greece, Turkey, Persia and Egypt. After the death of Alexander, the empire was divided among his generals.

Modern Macedonia, north of the Grecian frontier and south of Bulgaria, since the middle of the nineteenth century has been the scene of bitter rivalry between the mixed races of inhabitants. The great "Eastern Question" which has so long perplexed the powers of Europe in reality was a question of Macedonian existence. Among the inhabitants are Christians, Jews and Mohammedans of all nationalities, with the Turks, the ruling race, in the minority. The inhabitants frequently rose against the Turks, who put down these insurrections with the utmost cruelty, and occasionally indulged in unprovoked wholesale slaughter of Christians. Repeated representations by the powers failed to bring about any permanent improvement in condition.

In 1903 Russia and Austria demanded reforms in the administration of Macedonia, and Turkey apparently yielded. Nothing definite being done, the Macedonians rose in revolt and war was waged for some months, when they were persuaded to lay down their arms upon promises from Turkey of better government. For several years the situation remained without improvement; occasional outbreaks were suppressed, and unprovoked massacres and intolerable persecution of Christians marked Turkish rule. In 1912 the Balkan states declared war against Turkey. As a result of the war Macedonia was divided between the Balkan allies. W.E.L.

Related Subjects. The following articles in these volumes will be of interest:

Alexander the Great	Philip II (Macedon)
Balkan Wars	Saloniki
Greece, subtitle *History*	Turkey

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McGEE, *ma gee',* THOMAS D'ARCY (1825-1868), a Canadian poet, orator, journalist and statesman, one of the most brilliant of the group of leaders who shaped the course of events in the years immediately preceding Confederation. McGee was most effective in protest. He held office several times, but in his career the offices were subordinated to the principles for which he stood. He was not the type of man who could sit quietly in an office and perform routine duties. He was a born reformer, a fiery orator who was constantly stimulated to speech by more or less revolutionary doctrines. His speeches advocating Confederation were perhaps the strongest emotional appeals in support of that movement, and the very last speech of his life was a plea for mutual kindness and good will to cement the lately-formed union of the provinces.

THOMAS McGEE

McGee was born in Ireland, and to his death was an ardent lover of his native country. At seventeen he emigrated to Boston, Mass., where he speedily won fame by a Fourth of July oration, delivered, so one commentator says, "in such a transporting way that the multitude became entirely enchained." Even with due allowance for exaggeration, this is remarkable praise for a boy of seventeen. Some days later he was given a position on the Boston *Pilot,* and when he left it, at the age of twenty, he was editor-in-chief. In the *Pilot* appeared many of the poems which gave him a wide reputation. In 1845 he returned to Ireland, largely through the influence of Daniel O'Connell, who enlisted his literary ability in the struggle to free the Roman Catholics from political disabilities. After a year or two McGee became identified with the "Young Ireland" movement, but the danger of arrest led him to leave Ireland in 1848 and return to America.

For two years McGee then edited the New York *Nation,* in which he expressed himself so vigorously at the action of the clergy in dissuading the Irish from rebellion that the Roman Catholic archbishop of New York secured the suppression of the paper. McGee then edited a newspaper in Boston for several years, his views meanwhile becoming less revolutionary. In 1857 he moved again, this time to Montreal. There he established a journal called *The New Era,* made a reputation as an orator, and almost at once obtained a seat in the Canadian assembly. He was president of the council in 1862, and minister of agriculture in 1864, and in 1867 was elected to the Dominion House of Commons. He strongly denounced the Fenians, but his mature judgment was bitterly criticized by some of those who had supported the schemes of his youth. One of these men shot him dead after he had delivered a brilliant speech, already mentioned above, on the subject of cementing the union of the provinces.

In addition to numerous poems and articles on political topics, McGee wrote a *History of the Irish Settlers in America,* which is still a standard book; *History of Attempts to Establish the Protestant Reformation in Ireland;* and *Popular History of Ireland.* G.H.L.

McGILL, *ma gil',* **COLLEGE AND UNIVERSITY,** an institution of higher learning situated in Montreal, Canada. It was founded by the will of Hon. James McGill, a Canadian fur trader and statesman, and received a charter in 1821. The school when first opened, in 1829, had two faculties, arts and medicine. Since then, departments of law, applied science, engineering and agriculture, the graduate school and departments of music and dentistry have been added. A course in military instruction is given which prepares for commissions in the imperial army or the Canadian Permanent Corps. Graduates from the engineering courses readily find government employment. Students attend McGill from every part of the British Empire. For the convenience of prospective English students, entrance examinations are held each spring in London.

Women are admitted only to the arts courses at McGill, but courses in arts and science, given by professors and lecturers of the university, may be pursued by them at the Royal Victoria College for Women, established in 1899 in the same city. Macdonald College of Sainte Anne de Bellevue, Quebec, with its Agricultural School, Teachers' Training School and School of Domestic Science; McGill University Colleges of British Columbia, Vancouver, B. C., and Victoria, B. C., are known as incorporated colleges affiliated with McGill. Mount Allison University at Sackville, New Brunswick, and Acadia University at Wolfville, Nova Sco-

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tia, are universities in close relationship with McGill, especially in the faculty of engineering.

McGill College and University is nominally under the control of the Crown, but is really a private, endowed institution. The endowment exceeds $3,000,000 and there are 144,000 volumes in the library. The student enrolment is over 2,100, and the faculty numbers about 180. Thousands of its alumni and undergraduates served their country in the great War of the Nations.

McGILLIVRAY, *ma gil' i vri,* ALEXANDER (about 1740-1793), a chief of the Creek Indians, who took an active part against the colonists in the Revolutionary War (see CREEKS). McGillivray was the son of a Scotch trader and a half-breed Indian woman of royal stock, and was educated in Charleston, S. C. After his return to the Creek country, now Alabama, he acquired wealth by trading, and on the death of his mother succeeded to the leadership of the tribe, assuming the title "emperor of the Creeks." On the outbreak of the Revolutionary War his estates were appropriated by Georgia and he and his warriors joined forces with the British. Until 1790 he was a prominent instigator in the border hostilities, but visited New York in that year and made a treaty of peace in behalf of his tribe. He also resigned his commission as colonel in the Spanish service for the commission of major-general in the service of the United States, but continued to rule as chief of the Creeks until his death.

MACHAR, *ma kahr',* AGNES MAULE (1856-), also well known under her pen name of FIDELIS, a Canadian poet and writer of short stories, one who is distinguished not merely for excellence in composition but also for a high moral quality. "If there is something to be said for the right, a wrong to be redressed or a warning word uttered, I think we should always be ready with our pen." Much of her literary taste and aspiration comes to her naturally from her father, who was the second principal of Queen's University. From early youth she has been a contributor to periodicals at home and abroad, especially to the *Canadian Magazine,* the *Century Magazine* and the *Westminster Review.* In 1887 she won a prize offered by a Toronto journal for the best poem on the Queen's jubilee. Among her many published works are *For King and Country; Katie Johnson's Cross; Lucy Raymond; Stories of New France; Roland Graeme, Knight; Lays of the True North,* a collection of her poems; and *Stories of the British Empire.*

MACHIAVELLI, *mah kyah vel' le,* NICCOLÒ (1469-1527), an Italian statesman whose name has long been regarded as synonymous with all that is deep, dark and treacherous in statesmanship. This reputation has clung to him because of his remarkable book—*The Prince.* In this he argued that Italy could become a united nation only through the leadership of a despotic prince who would use any means, no matter how wicked, to create a new state. Machiavelli was a native of Florence and lived in troublous times, during the exile of the Medici family and the republican influence of Savonarola. For fourteen years he held the position of first secretary of the council of the Florentine republic, and proved himself an efficient officer but never a leader of men. He was sent on many missions, during one of which he was closely associated with the unscrupulous Cesare Borgia, who infatuated him and whom he idealized as a perfect prince and hero. In 1512 the Medici returned to power, and Machiavelli was deprived of his office. He retired from political life and devoted himself to literature. His best-known works are a *History of Florence, The Art of War, Discourses Upon the Ten First Books of Livy,* several comedies and, most famous of all, *The Prince.* He may be regarded as the founder of that school of politics which recognizes no moral law and separates ethics and politics.

MACHINE, *ma sheen'.* A machine is any device that will perform work. The hammer whose claw will pull a nail from a board is a machine. The pulley is as truly a machine as is the locomotive; the difference lies in the amount of work each can perform, in their comparative complexity, and in the manner in which their work is performed.

The age in which we live is often described as the age of the machine, and for the best of reasons. The coming of machines to supplant hand labor separated the old-world order from the new and gave a demonstration of the truth that "time maketh ancient good uncouth." The changes it wrought were profound and far-reaching—they penetrated every department of life. Indeed, it is probably no exaggeration to say that the life of the average man of to-day differs more from that of a Frenchman living in the reign of the great Louis XIV than the latter's life differed from that of a Roman citizen under the Caesars. Machines, naturally, did not bring about all these changes, but their influence was very great.

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The Greek and the Roman patricians indulged in a lavish display and a liberal scale of living, but they could hardly have imagined the wealth of the modern world. Compared with London and New York, the cities of the classic world were poor, and the cities of the medieval world were poverty-stricken. The great wealth of the present world is due largely to machines.

Changes in Production. Before the machine was invented, man had what he could make with his hands. He was often a cunning craftsman who loved and wrought beautiful articles, but the rate of production was necessarily slow. Surplus wealth did not accumulate. The change in man's material condition dates from 1769, the year in which James Watt invented the steam engine. The steam engine was only the first of a series of inventions, which included the cotton gin, power looms for weaving, and steam locomotion on land and sea. Invention has gone steadily on in every department of life for a century and a half; it has changed the social habits of all civilized peoples, and has completely revolutionized industry.

It has been estimated that the power used in machinery produces twelve times as much as all human labor could produce without it. The natural result has been an enormous increase in production, with a consequent cheapening of the articles produced. Invention has followed invention. The thirteenth annual report of the United States Department of Labor on hand and machine labor listed 672 examples of labor-saving machinery. Only a few of the more important machines can be referred to here.

The results obtained with the cotton gin are among the most striking. It was invented by Eli Whitney in 1793. By the old hand method, a worker would have spent about two years in turning out a bale of cotton. The machine produces from three to fifteen bales a day. Improved methods resulted in a fall in price of about thirty cents a pound in a little over a century. The introduction of the power loom revolutionized the industrial life of England. Cotton spinning ceased to be a cottage industry and was carried on in factories by hired labor. The old spindle and distaff gave way before the spindle of the modern machine, which can be run at a speed of 11,000 revolutions a minute. Steam was first successfully applied to navigation early in the last century. In a hundred years the improvements have been amazing. Instead of Fulton's *Clermont,* we have the *Imperator,* driven through the water at thirty miles an hour, by Parsons turbine engines rated at 68,000 horse power. Delicate but powerful electrical machines have recently become a serious rival of steam power.

By no means the least wonderful of the machines perfected in the last century are those used in printing. The linotype can be made to do the work of about five printers, nor is its mechanism less remarkable than its speed. The huge presses on which the metropolitan papers are printed are capable of turning out 96,000 copies of a sixteen-page paper an hour, counted and folded.

Effect on Labor. Labor-saving machinery has often been bitterly assailed by the workers whom it has displaced. In England during the transition period, the weavers, reduced to abject poverty, forced to leave their homes in the country and become wageworkers in crowded towns, revolted and smashed the machines. Hundreds became public charges. In general, however, it is believed that the workers as a whole do not suffer through the introduction of new machines, though it is not denied that certain groups of workers may be subjected to great temporary hardships during periods of adjustment to new conditions. At present the hopes of the workers may be said to be fixed on obtaining a more equitable distribution of the increased riches brought by the machine. See INVENTION. E.D.F.

Related Subjects. The following list of articles in these volumes contains not only machines and certain important devices connected with machines, but instruments as well:

Adding Machine	Chronometer
Air Brake	Clock
Air Compressor	Compass
Air Engine	Cotton Gin
Air Pump	Crane
Archimedean Screw	Diagonal Scale
Balance	Dictograph
Barker's Mill	Die
Barometer	Dipping Needle
Bell	Dynamo
Bellows	Electric Bell
Belt	Electric Machine
Block and Tackle	Electric Motor
Blowing Machines	Engine
Blowpipe	Field Glass
Boiler	Filter
Boring Machines	Flying Machine
Calculating Machines	Galvanometer
Cam	Gas Engine
Camera	Gauge
Camera Lucida	Governor
Camera Obscura	Gyroscope
Carburetor	Hectograph
Cash Register	Heliograph

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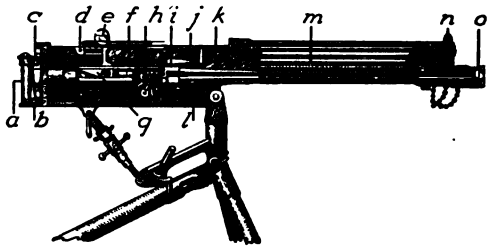
Hydraulic Engine
Hydraulic Ram
Hygrometer
Injector
Kinetograph
Knitting Machine
Lathe
Lens
Level
Lightning Rod, subtitle under Lightning
Linotype
Lock
Magneto-Electric Machine
Micrometer
Microscope
Mimeograph
Monotype
Mowing Machine
Multigraph
Numbering Machine
Opera Glass
Ophthalmoscope
Pedometer
Periscope
Planing Machine
Plummet
Polariscope
Printing Press
Pulmotor
Pump
Quadrant
Radiometer
Rain Gauge
Ratchet
Reaping Machine
Safety Valve
Screw
Seismograph
Sewing Machine
Sextant
Slide Rule
Slot Machine
Snowplow
Solar Engine
Solar Microscope
Spectroscope
Speedometer
Spinning Jenny
Spinning Wheel
Spirometer
Steam Engine
Steam Hammer
Steam Shovel
Stereopticon
Stereoscope
Stethoscope
Talking Machine
Telautograph
Telegraph
Telephone
Telescope
Theodolite
Thermograph
Transit Instrument
Trip Hammer
Turbine Wheel
Typewriter
Valve
Vise
Voltmeter
Watch
Water Wheel
Wedge
Weighing Scale
Wheel and Axle
Windlass
Windmill

MACHINE GUN, a military weapon specially designed to maintain a rapid fire, delivering sometimes as many as 450 bullets per minute. The War of the Nations, which convulsed Europe in 1914, was largely a struggle of heavy artillery and machine guns instead of light artillery and rifle fire, as in previous wars. Machine guns assumed such importance and were so effective that rifles became of secondary importance, valuable chiefly in impetuous charges on the enemy's lines, and even then the final rush of the attacking force towards the enemy's trenches, preceded always by big gun bombardment, was supported by machine-gun fire. In the hand-to-hand conflict that ensued the soldiers relied largely on the bayonet.

The modern machine gun is not the result of one invention, but of a series of inventions and improvements. As now employed in war, the object of the machine gun is to concentrate the power and deadliness of a great number of rifles in one particular place. One machine gun delivering 300 shots per minute upon a bridge over which hostile troops were attempting to cross would be equal in effect to sixty rifles in the hands of expert sharpshooters. A concentration of machine-gun fire is more deadly than shrapnel, and more dreaded than the fiercest bayonet charge.

The Maxim. The accompanying illustration shows the various parts of the most approved machine gun of the present day. This gun,



PARTS OF A MAXIM MACHINE GUN

(*a*) Handle block
(*b*) Firing trigger
(*c*) Safety catch to prevent accidents
(*d*) Sight rack
(*e*) Rear sight
(*f*) Recoil plate
(*g*) Crank
(*h*) Firing pin
(*i*) Carrier
(*j*) Feed box
(*k*) Barrel
(*l*) Ejector tube spring
(*m*) Water jacket for cooling barrel
(*n*) Front sight
(*o*) Nozzle

named after Sir Hiram Maxim, its inventor, was the first machine gun which automatically performed the operations of loading, firing and removing the empty cartridges. It was adopted by the British army in 1889, and so perfect did it prove that few improvements have been found necessary. Maxim first offered his invention to the United States military authorities but they received him without enthusiasm. He then took it to Europe, where it was very eagerly accepted. It has since been adopted with certain modifications by nearly all European armies.

The barrel is surrounded by an outer tube or jacket filled with water, to prevent overheat-

GUN IN OPERATION

ing. The cartridges are supplied from a belt which passes over a feed wheel behind the breech. It is claimed that the full capacity of

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the Maxim is 750 shots per minute, but under war conditions 300 per minute is a good average. The gun is mounted on a tripod, the rear leg of which supports a seat for the operator. The latest pattern Maxim gun used by the British weighs thirty-six pounds, and is easily transported from place to place. For use with mounted troops the German army is supplied with a Maxim weighing sixty-one pounds, which is mounted on a carriage weighing 110 pounds. The German infantry are provided with machine guns which weigh thirty-eight pounds, with a carriage of seventy-five pounds weight. Maxims and all other machine guns are built to fire cartridges similar to those used in the rifles of the army to which they are attached.

The Hotchkiss. The Hotchkiss gun, named from its inventor, Benjamin Berkley Hotchkiss (1826-1885), uses the gas formed by the powder to operate the mechanism. The gas escapes through a small hole in the barrel to a tube underneath, and pushes back a piston which operates the mechanism. This gun was in general use in the armies of the leading nations until replaced by more recent inventions.

Other Machine Guns. Practically every machine gun now in use is a modification of the original invention of Maxim. The Benet-Mercie gun, in use in the United States army, has no water jacket for cooling purposes. It has a barrel of about an inch in thickness and can be fired continuously for some minutes before becoming too hot to operate. Its capacity may be as high as 400 shots per minute, but under average conditions it shoots only about 250 times a minute. The gun weighs twenty-seven pounds and the tripod weighs fifty pounds. In 1915 the United States army began experimenting with the Vickers machine gun, a water-cooled implement, with a jacket similar to the Maxim. Its rate of firing is about the same as the Benet-Mercie, and in tests it has fired 6,000 shots without stopping.

The Hotchkiss gun, referred to above, is very highly favored by the French military authorities. It is one of the most efficient of all guns for use in military aeroplanes. The French term *mitrailleuse* refers technically to an old-style, rapid-firing gun used in the Franco-German War in 1870, and it is still applied to machine guns of all patterns in France.

The various kinds of machine guns have an effective range varying from one-third to seven-eighths of a mile. L.R.G.

Consult *Handbooks of Automatic Machine Rifle and Maxim Automatic Machine Gun,* published by the War Department of the United States.

MACKAY, *ma kay',* JOHN WILLIAM (1831-1902), a man who began his career as a poor boy in New York, but during his life amassed a great fortune, the result of a strong character and perseverance. He emigrated to America from Dublin, Ireland, and settled with his parents in New York, where his father soon died. When the rush to the California gold fields began, Mackay was learning the trade of shipbuilding, but with others he left for the West, where he learned thoroughly the business of mining and was ready for his great opportunity when it came. He was one of the discoverers of the famous "Bonanza" mines of Nevada. With five other men he gained control of these mines, Mackay having twice as much stock as all the others. From one mine alone $150,000,000 in gold and silver was taken out. Mackay also became a partner of the firm which owned the Bank of Nevada. In 1884, in company with James Gordon Bennett, he organized the Commercial Cable Company and the Postal Telegraph Company, and was successful in a fight with the old cable lines, which sought, by reducing their rates, to force him out of business. The cable company succeeded in laying two lines across the Atlantic. One of Mackay's many public gifts is the Roman Catholic Orphan Asylum at Virginia City, Nev. His son, Clarence H. Mackay, succeeded to his business interests.

McKEES'PORT, PA., a city of Allegheny County, fourteen miles southeast of Pittsburgh, in the heart of the bituminous coal and natural gas fields of the state. It is situated on the Monongahela River, at the mouth of the Youghiogheny, and on the Baltimore & Ohio, the New York Central, the Pennsylvania and the Pittsburgh & Lake Erie railroads. The rivers are crossed at this point by eight bridges. Electric lines extend to Pittsburgh and to other cities and towns in the Monongahela Valley. Population in 1910, 42,694; in 1916, 47,521 (Federal estimate). The area is nearly four square miles.

McKeesport is the center of a vast iron and steel industry. It has been called the "Tube City," because of its largest concern, one of the greatest tube works in the world, employing nearly 8,000 men. Among the principal manufactures are sheet and tin plate, tool steel, projectiles, glass, coke and coal-tar products. There is an important trade in locally-

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manufactured goods, coal and lumber. The more prominent public buildings are the Federal building, city hall, Carnegie Library, Masonic Temple, Y. M. C. A. building and the city hospital.

McKeesport was founded in 1795, and was named in honor of the first settler, a Scotchman who operated a ferry across the rivers. The place was unimportant until 1830, when the coal fields were opened. It was incorporated as a borough in 1842 and became a city in 1891. The commission form of government was adopted in 1913. MC L.L.

McKEES ROCKS, PA., a borough in Allegheny County, adjoining Pittsburgh and situated opposite Allegheny on the Ohio River. It is on the Pittsburgh & Lake Erie and the Pittsburgh, Chartiers & Youghiogheny railroads. The population in 1910 was 14,702; in 1916 it was 19,949 (Federal estimate). The area of the borough exceeds one square mile. Its leading industrial establishments are iron and steel works, railroad machine shops, and manufactories of lumber, wall plaster, concrete, freight and passenger cars. There is a Federal building, and the borough has the Ohio Valley General Hospital.

MACKENZIE, *ma ken' zi,* the name borne by a former district of Canada, which constituted the nucleus of the present North West Territories. It lay far to the north, touching the Arctic seas, and only Yukon was farther to the west; on the east was the district of Keewatin, and on the south Athabaska and British Columbia. It had an area of 563,200 square miles, but so inaccessible was it and so rigorous its climate that its population remained very small. In 1901 it had but 5,216 inhabitants, most of them in settlements along the Mackenzie, the chief river of the district.

In 1912 Mackenzie was combined with Franklin and with the northern part of Keewatin to form the North West Territories. F.O.

MACKENZIE, ALEXANDER (1822-1892), a Canadian statesman, the first Liberal Premier of the Dominion, a man whose integrity has become proverbial. In an age when corruption was common and too often excused, no breath of suspicion ever attached to Alexander Mackenzie. "While perhaps too cautious to be the ideal leader of a young and vigorous community, his grasp of detail, indefatigable industry and unbending integrity won him the respect even of his political opponents." Aside from his honesty, Mackenzie's most prominent characteristic was his opposition to class distinctions of any kind, a democratic attitude which made him three times decline the honor of knighthood.

Alexander Mackenzie was born near Dunkeld, Perthshire, Scotland, on January 28, 1822. As a boy he spent several winters in school, but at thirteen he began to work, learning the trade of a stonemason. His father died in 1836, leaving seven sons, all of whom afterwards settled in Canada. Alexander emigrated in 1842, and settled at Kingston, Ont., where he worked as a stonecutter and afterwards became a building contractor. In 1847 he removed to Sarnia, Ont., where he continued to prosper to such an extent that about 1852 he began to give a part of his time to other interests. In that year he became editor of the Lambton *Shield,* a Liberal organ through which he expressed his personal desire for an expansion of popular political rights as well as his party's principles in general.

ALEXANDER MACKENZIE

After 1852 Mackenzie gave himself wholly to public affairs. In 1861 he was elected to the Canadian assembly, in which his wide range of knowledge and his readiness in debate gave him a powerful influence. He strongly advocated Confederation, and in 1865 declined a place in the coalition Ministry which was formed after the resignation of George Brown. Mackenzie was at first one of Brown's chief lieutenants, but after 1867 was the recognized leader of the Liberals in Parliament. He was elected to the first House of Commons in 1867, and from December, 1871, to October, 1872, also sat in the Ontario provincial assembly and was provincial treasurer in the cabinet of Edward Blake. Dual representation, which allowed a man to represent his constituents both in the provincial and the Dominion legislative bodies, was abolished in 1872, and Mackenzie thereafter devoted himself to national politics.

First Liberal Premier. On the resignation of Sir John Macdonald in 1873, as a result of the Pacific railway scandal, Mackenzie was called on to form a Ministry. Of the many important changes made by the new government, espe-

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cially noteworthy were the introduction of the Australian ballot (1874), the establishment of the Dominion Supreme Court (1875) and the organization of a government for the North West Territories. Mackenzie was also instrumental in securing changes in the Governor-General's instructions from the British government, so that he is now practically bound to accept the recommendations of the Dominion Cabinet. Mackenzie's five years in office were marked by efficiency and economy in government, and by industrial depression throughout the country. This depression, combined with the Conservative demand for a protective tariff, defeated the Liberals in the general elections of 1878. For two years thereafter Mackenzie led the Liberals in opposition, but in 1880 ill health led to his retirement from active leadership, although his constituents kept him in the House of Commons until his death, April 17, 1892, at Toronto. G.H.L.

Consult Buckingham and Ross's *Life and Times of Alexander Mackenzie.*

MACKENZIE, Sir Alexander (1755-1820), a Canadian explorer and fur trader, discoverer of the Mackenzie River and the first white man to reach the Pacific coast of Canada from the interior. Mackenzie was born in Scotland, at Inverness, but emigrated to Canada in 1779. Soon after the organization of the Northwest Company to oppose the Hudson's Bay Company's monopoly, he entered its service, and in 1784 was sent to Detroit with a small party of traders. The traders already established in that section stirred up the Indians against him, and it was only after a long struggle, during which one of his companions was murdered and several were wounded, that the intruders were permitted, in 1787, to share in the trade.

Two years later, in June, 1789, Mackenzie set out on the first of the exploring trips which made him famous. Leaving Fort Chipewyan with a small party of Canadians and Indian guides, he traversed the region about Great Slave Lake, and discovered a great river, now called the Mackenzie, which he traced to its mouth in the Arctic Ocean. After setting up a post on the shore as evidence of his discovery, Mackenzie returned southward, reaching Fort Chipewyan just 102 days after his departure. Three years later he made a second trip, on which he ascended the Peace River, crossed the Rocky Mountains, and finally reached the Pacific Ocean on July 22, 1793. The very next day a band of Indians treacherously attacked him, and all but murdered him. Thereafter Mackenzie devoted his energies to the fur trade, and amassed a considerable fortune. In 1801 the honor of knighthood was conferred upon him, and in 1802 he organized a trading company (Alexander Mackenzie & Co.), which threatened serious competition in the fur trade for two years, when it was absorbed by the Northwest Company. Mackenzie's later years were spent in Scotland, where he died. His narrative of his travels, entitled *Voyages on the River Saint Lawrence and through the Continent of North America to the Frozen and Pacific Oceans in the Years 1789 and 1793,* is a valuable document in the study of Canadian history.

MACKENZIE, Arthur Stanley (1865-), a Canadian educator and scientist, one of the foremost contemporary physicists, and president of Dalhousie University since 1911. Dr. Mackenzie was born at Pictou, N. S., attended the public schools of Pictou, New Glasgow and Halifax, and finally was graduated with honors from Dalhousie University in 1885. The two years immediately following his graduation were spent as assistant master at Yarmouth (N. S.) Academy. He was from 1887 to 1889 tutor in mathematics in Dalhousie University, then spent two years in advanced study at Johns Hopkins University, and from 1891 to 1905 taught physics at Bryn Mawr College. Since then, with the exception of the year 1910-1911, during which he was professor of physics at Stevens Institute of Technology, he has been at Dalhousie University, at first as professor of physics, and since 1911 as president. Dr. Mackenzie is the author of *Laws of Gravitation* and of many scientific pamphlets and papers. Dr. Mackenzie is one of the most conspicuous examples, perhaps the most conspicuous in Canada, of that rare combination, a scientist who has the gift of being able to teach.

MACKENZIE, Sir William (1849-), a Canadian railroad builder, whose ability as a financier, added to the engineering skill and organizing capacity of Sir Donald Mann, is responsible for the construction and successful operation of the Canadian Northern Railway. Mackenzie was born at Kirkfield, Ont. He received a public school education, as a young man taught school, and later entered the lumber business. His first contact with railroad work was as contractor for the Midland division of the Grand Trunk Railway. Later he built a part of the Rocky Mountains section of the Canadian Pacific Railway, and since 1886, in partnership with Sir Donald Mann, has been

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responsible for the construction of thousands of miles of line in Canada and other countries. The first railway built and also owned by Mackenzie, Mann & Co. was the Lake Manitoba Railway & Canal Company's line, 100 miles long, completed in 1896. Out of this small beginning has grown the great Canadian Northern system, comprising over 8,000 miles of railway. Sir William is president of the Canadian Northern and of many subsidiary railways, street railways and other public service corporations. He also controls transportation lines in Cuba, Mexico and Brazil. In 1913, when the Canadian Northern Railway was in dire financial straits, Sir William was instrumental, if not chiefly responsible, in obtaining assistance from the Dominion government. The honor of knighthood was conferred on him in 1911.

MACKENZIE, William Lyon (1795-1861), a Canadian reformer and statesman, leader of the Rebellion of 1837 in Upper Canada and for a generation conspicuous in every movement for radical political changes. Mackenzie was a strange mixture of the pathetic, the ludicrous and the heroic. He was a born agitator, and like every man who is constantly laboring on behalf of a propaganda, he tended to exaggeration and, occasionally, to misrepresentation. On the other hand, he was a man of unquestioned integrity and of great moral courage, a man who could not be bribed, bullied or cajoled. He was lacking, perhaps, in a sense of proportion, so that trivial matters sometimes roused him to a degree worthy of a great cause. Yet on the whole he is one of the noteworthy characters of his time, and without his efforts the progress of Canadians towards political freedom would have been long delayed.

WILLIAM LYON MACKENZIE

Mackenzie was born near Dundee, Scotland, on March 12, 1795. The death of his father less than a month later left the family in poverty, a condition against which he had to fight all his life. He had practically no schooling, and as a young boy earned his own living. He emigrated to Canada with his mother in 1820, settling first at York (Toronto), later Dundas, and finally Queenston, where he became a storekeeper. The general dissatisfaction with political conditions in Upper Canada led him to take an interest in public questions, and in 1824 he began to publish a newspaper, called the *Colonial Advocate,* in which he expressed bitter criticism of the government. Shortly afterward he removed to York, the capital of Upper Canada, where he continued to issue his paper. To punish him for his steady attacks on the government a mob wrecked his printing office, but Mackenzie brought suit against the leading rioters and was awarded $2,500 damages, a windfall which enabled him to continue his publication with greater energy than ever before. Most of the reforms he advocated have since been adopted, but the bitterness of his attacks roused great opposition among the Tories, headed by Sir John Beverly Robinson.

His Political Career. In 1828 Mackenzie was elected to the assembly. He was reëlected two years later, but was denied this seat on the ground that he had published an account of parliamentary proceedings without a license to do so. This libel, as it was called, was an obvious pretext, the real reason being his extreme radicalism. Four times more he was elected, and four times was refused admission. Finally the government refused to issue new writs of election, and York for several years was without its proper representation in the assembly. In 1832 Mackenzie went to England to advocate certain reforms in the Canadian government, and also to secure the removal of certain officials, a mission in which he was successful. In 1834, shortly after his return to Canada, Toronto, as York was now called, elected him its first mayor, and at the expiration of his term elected him to the assembly, to which he was then regularly admitted.

For a year or two the Reformers were in the majority in the assembly, but in 1836 Mackenzie and all the other leaders of his party were defeated for reëlection. The result of this defeat was to drive Mackenzie along the same path taken by Papineau (see Papineau, Louis J.), with whom the Upper Canada Liberals had been in consultation for a year. Mackenzie now began openly to applaud the people of Lower Canada, who were planning insurrection, and advocated a republican form of government. From such talk to open rebellion was a short step, and on November 25, 1837, Mackenzie proclaimed a provisional government. He gathered between 700 and 800 men to seize Toronto, but a series of delays gave the governor, Sir Francis Bond Head, time to prepare a defense. In an engagement at Montgomery's

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Farm, on December 7, the Reformers were routed, and Mackenzie himself fled to the United States. He established his headquarters on an island in the Niagara River. There for several months he proceeded to annoy both the Canadian and the American governments, until he was finally arrested on a charge of violating the neutrality of the United States and was sentenced to serve eighteen months in prison at Rochester, N. Y. He actually served eleven months, an experience, in the words of a canny biographer, which "cured him of his love for republican institutions."

After his pardon in 1840 Mackenzie worked in the New York customhouse and later for the New York *Tribune*. In 1849 the Canadian government proclaimed a general amnesty to all who had taken part in the rebellion. Mackenzie thereupon returned to Toronto, and from 1851 to 1858 again served in the assembly. Towards the close of this period, the disease of which he died, softening of the brain, had already begun to show its effects and finally compelled his retirement from public life. He died at Toronto on August 29, 1861. G.H.L.

Consult Lindsey's *Life and Times of William Lyon Mackenzie;* Dent's *Story of the Upper Canada Rebellion.*

MACKENZIE RIVER, the greatest river wholly in Canada, and except the Mississippi, the greatest in North America. Its length, 2,525 miles, is nearly as great as that of the Missouri River, and its volume is considerably

COURSE OF THE MACKENZIE

larger. Its average minimum discharge is approximately 500,000 cubic feet per second. This means that in a single day the water discharged by the river would make a lake two miles long, one mile wide and a thousand feet deep throughout. In flood season this amount is increased many times. The average width of the Mackenzie is about a mile, and it has a fall of approximately six inches to the mile. The basin of the Mackenzie River system, including the Peace River, has an area of 682,000 square miles, or nearly one-fifth of the area of the whole Dominion of Canada. The river takes its name from Sir Alexander Mackenzie, the first man to descend its course to the mouth.

Details of Its Course. The head stream of the Mackenzie River system is the Finlay, which rises in the Rocky Mountain Trench, in the north-central part of British Columbia. After a southeasterly course of 250 miles the Finlay meets the Parsnip, and the combined stream, called the Peace River (which see), cuts its way eastward through the Rocky Mountains and then flows northward and eastward through one of the most fertile sections of Canada until it empties into the Slave River. The Slave River is the outlet of Athabaska Lake, into which flows the Athabaska River, which is sometimes regarded as the southern head stream of the Mackenzie system. The Slave River, after a northerly course of 265 miles, flows into Great Slave Lake, from whose western end it emerges as the Mackenzie River. The Mackenzie River proper, from Great Slave Lake to the Arctic Ocean, is over 1,000 miles long, about the distance from Chicago to Quebec.

Like the Yukon, the Mackenzie system is navigable for nearly the whole of its length. The Mackenzie proper is navigable throughout its length usually from the middle of June until nearly the end of October. The same is true of the Slave River. The Athabaska River is navigable as far as the Grand Rapids near Fort McMurray, and is then navigable above the rapids to its outlet from Lesser Slave Lake. The Peace River is navigable for 220 miles above its mouth. The Mackenzie system includes at least 2,000 miles of navigable waterways.

Through its upper course the Mackenzie flows through a rich agricultural and timber district, and farther north there are large deposits of lignite on its banks. For seventy-five or eighty miles above its mouth it flows through a flat delta, parts of which have not yet been surveyed or even explored. Fish are abundant, especially whitefish and trout; the latter often attain tremendous size. Wild game is still

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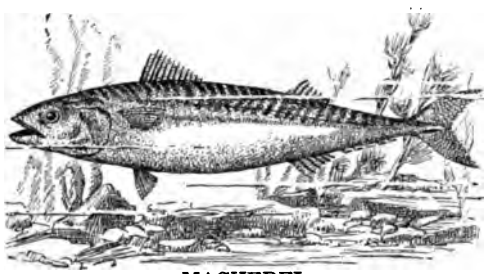
plentiful along the banks, the characteristic animals being the moose, woodland caribou, lynx, marten and porcupine. Farther north the musk ox often appears. Among the birds are the rough-legged hawk, northern shrike, pine grosbeak and white-winged crossbill, all of which keep well to the north; farther south are numerous warblers, the Canada jay, olive-backed thrush, white-throated sparrow and several varieties of woodpeckers.

Taken as a whole, the Mackenzie basin is one of the most interesting geographical units of North America. For the present it is still a paradise for the sportsman, or for the man who craves adventure and outdoor life. It includes mountains and plains, forests and barren lands; it has a great variety of animal life, animals which tempt both the trapper and the hunter. Many parts of it, especially the great Peace River Valley, are suitable for agriculture. In short, the Mackenzie basin is the greatest part of the unexploited Canadian Northwest. W.F.Z.

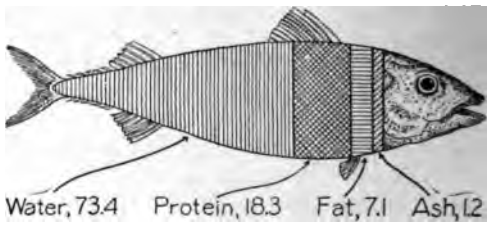
MACKEREL, *mak' er el,* the name of a group of fish found in the open seas of almost all tropical and temperate zones. The *common mackerel* is highly prized for food and easily recognized by its coloring and by its perfect



MACKEREL

proportions. It swims very swiftly, has great power of endurance and seems to be always in motion. In length this fish varies from ten to eighteen inches, and in weight from one-half to three pounds. It is an inhabitant of the North Atlantic Ocean, ranging from Cape Hatteras to the Strait of Belle Isle, between Newfoundland and Labrador, on the American coast, and in European waters from Norway to the Mediterranean and Adriatic seas. This fish is of varying blue and green, with wavy black stripes on top, and of a silvery-white below. When the clouds in the sky have a certain fleecy appearance, formed in zigzag parallel rows, we call them *mackerel* or *mackerel back* clouds, from their resemblance to the markings on the backs of this fish. Two large fins are found on the dorsal side (back) of the mackerel, two smaller ones on the ventral (under) side, and five tiny finlets on both sides just in front of the tail, which is large and forked. The body is covered with small scales, but there are none on the head.

These fish travel near the surface of the sea in schools, sometimes so large as to cover ten square miles, and feed upon other small ocean fish. Their spawning season on both coasts extends from May to July, June being the most



COMPOSITION OF THE MACKEREL

Its fuel value is 645 calories per pound, a little greater than that of the majority of fishes. It averages well with various cuts of veal as a heat producer.

important month. The deeper waters from Long Island to the Gulf of Saint Lawrence are the chief spawning grounds on the American coast. Mackerel are caught in nets, which are floated in the water hanging straight down. As the fish cannot see the nets, the color of which is almost that of the water, they dash head-first into these traps, become entangled in the meshes, and so are made captives. The catch for the United States in average years is about 13,000,000 pounds, valued at nearly a million dollars, and that of Canada over 11,400,000 pounds, with a value approximating $650,000. Gloucester, Mass., is the chief mackerel fishing center in the former country (see FISH, subtitle *Deep-Sea Fisheries*). The average food value of one pound of fresh mackerel as a heat producer is 645 calories, while that of the same quantity of fresh beef loin is 615 calories (see FOOD, subhead *Chemistry of Foods*). G.W.

MACKINAC, *mak' i nak,* or *mak' i naw,* **ISLAND,** a small island at the northwestern end of Lake Huron, politically a part of Mackinac County, Michigan. It is now a popular summer resort, but was formerly notable as one of the oldest white settlements in the New World. About 1670 Count de Frontenac, governor of New France, caused the island to be settled. At that time it was called *Michilmackinac,* an Algonquin word meaning *place of the big lame person.* Just what was the significance of this word is unknown. The Jesuit missionary, Pere Marquette, established a mis-

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sion there in 1671; soon after it became a military post, and Old Fort Mackinac, built in 1712, still stands. In 1761 it was surrendered to

ARCH ROCK
The water of the strait is over 200 feet below the opening, and a delightful view is presented.

the British, but it became American property after the Revolutionary War. During the War of 1812 it was an important military post, was captured again by the British and held successfully against American attacks. It was restored to the United States in 1815.

The city of Mackinac Island, lying under the hills and below the fort, was chartered in 1899. Old Fort Mackinac, formerly a government preserve, was given by the United States government to the state of Michigan and is maintained as a state park. This park covers more than half the island; one of its most picturesque spots is Arch Rock.

McKINLEY, *ma kin' li,* MOUNT, the highest mountain of North America, situated in Alaska, 150 miles north of the head of Cook inlet. It is covered with perpetual snow, and has many glaciers. The actual summit has never been reached by man, but Dr. Frederick A. Cook, of polar exploration notoriety, laid claim to the accomplishment of the feat. He failed, however, to prove his right to the honor. In 1912 two explorers ascended to a height of 20,300 feet; the peak rises only a few feet higher. See COOK, FREDERICK A.

McKINLEY, *ma kin' li,* WILLIAM (1843-1901), an American soldier and statesman, twenty-fifth President of the United States and the third President to lose his life at the hands of an assassin. McKinley's life is still too recent for historians to form a final estimate of his public or private character, but there are certain characteristics which time will not erase from memory. Quiet and dignified in his manner, both among his friends and on the public platform, he was a man to inspire confidence. McKinley was true to the thousands of his friends, and he had the warmest sympathy for men of all classes and all nations. He had a remarkable gift for foreseeing the trend of public opinion, and shaped his course accordingly. For years he held devotedly to his ideal of commercial protection, yet when he saw the United States outgrow it, like a wise man he changed and broadened his ideal. This attitude was not the attitude of a cheap politician; on the contrary, it was a characteristic which enabled McKinley to rise above petty controversies. He was preëminently a man of high principles, of unchallenged integrity.

Ancestry and Youth. McKinley was born on January 29, 1843, at Niles, Ohio. His great-great-grandfather, a Scotch-Irishman, came to America in 1743 and settled in Pennsylvania. James McKinley, the grandfather of the President, moved to Ohio about 1830, and laid the foundations of the family fortune in the iron industry. William McKinley, like his father before him, began to work in the iron foundry when he was still a boy, but he later went to school and finally entered Allegheny College in 1859. He was brilliant in his studies, especially mathematics and languages, but withdrew from college after a year on account of ill health.

Military Career. At the outbreak of the War of Secession McKinley, though only a boy of eighteen, was teaching school. He at once en-

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listed in the Twenty-third Ohio Volunteers, of which William S. Rosecrans was first colonel. The regiment served under McClellan in West Virginia in 1861 and in the next year took part in the battles of South Mountain and Antietam. At Antietam McKinley distinguished himself by great gallantry under fire; for this he was recommended for promotion by Colonel Rutherford B. Hayes, who had succeeded Rosecrans as commander of the regiment. On September 23, 1862, McKinley was commissioned second lieutenant, and by the end of the war had risen to the brevet rank of major, the title by which he was commonly known until his election to the governorship of Ohio. He served at various times as aide to General Hancock and General Crook, and was particularly prominent in the battles of Fisher's Hill and Cedar Creek. Cedar Creek was the battle which General Sheridan turned from defeat into victory after his stirring ride from Winchester.

Law and Politics. Major McKinley was mustered out on July 25, 1865, and immediately began the study of law. He was admitted to the Ohio bar in 1867, and established himself in practice at Canton, the county seat of Stark County. This was normally a Democratic district, and McKinley was a Republican, but the voters elected him prosecuting attorney in 1869. In 1872 he made frequent speeches in support of Grant for President, and in 1875 in support of Hayes, who was candidate for governor of Ohio. His vigorous speeches, especially his demand for the resumption of specie payments, made him more than a local figure, and in 1876 he was elected to the House of Representatives. Of this body he was a member until 1891, with the exception of an interval of five months in 1884. In his first term he spoke in behalf of a protective tariff bill, and later voted for the Bland-Allison Act, thus allying himself with the Silver Republicans from the Western states. Steadily reëlected to Congress in spite of every effort to defeat him, McKinley rose in influence, succeeded Garfield in 1880 as a member of the Committee on Ways and Means, and in 1888 became chairman of that committee, a position second only to the Speakership in importance.

During these years Representative McKinley became one of the leaders of the Republican party. He was a regular delegate to its national conventions, twice drafted the tariff plank in the party platform, and in 1888 was one of John Sherman's campaign managers. Reëlected to the House of Representatives for the seventh time in 1888, he framed and carried through Congress the high tariff bill which bears his name (see TARIFF). The McKinley Act became a law on October 6, 1890. One other important measure with which McKinley was connected was the "Sherman Law." In June, 1890, he introduced a bill providing that certificates issued for silver bullion purchased by the government should be legal tender for private debts and also establishing the free coinage of silver at the ratio of 16 to 1 when silver had so

WILLIAM McKINLEY
He defeated William J. Bryan for the Presidency of the United States in 1896, after the most bitterly fought campaign since the War of Secession.

risen that 371.25 grains were worth 23.22 grains of gold. The bill passed the House, but was entirely recast in the Senate, and eventually emerged from Congress in the form of the Sherman Law.

Governor of Ohio and Presidential Candidate. Ohio went Democratic in 1890, and McKinley was defeated for reëlection. In 1891, however, after the close of his service in Congress, he was elected governor of Ohio in an exciting campaign, and in 1893 was reëlected by a plurality of 81,000, one of the largest pluralities ever recorded in the state. During his four years as governor, McKinley worked successfully to improve Ohio's canals, roads, and public institutions. Perhaps his greatest achievement was the establishment of a state board of

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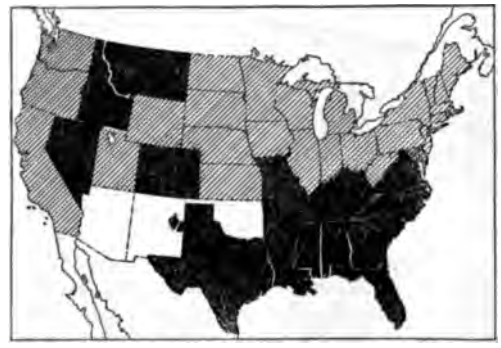
ation to settle disputes between employ- ıd employees. In general his administra- was such as to make him more than ever ɜ a national figure.

the Republican National Convention at Louis in 1896 McKinley received 661½ out of 906 on the first ballot, and thus the nomination for President. Although as at one time an advocate of the free ge of silver, he now quieted the fears of of his supporters by a vigorous campaign vor of the gold standard. McKinley re- d a popular vote of 7,104,779 and an elec- vote of 271, as against 6,502,925 and 176 ctively for Bryan. The campaign was rkable for the contrast in the methods ɜed by the two candidates. Bryan, the



PRESIDENTIAL ELECTION MAPS 1900

ıe states indicated by shaded lines gave their electoral votes to McKinley; those in solid black carried by Bryan electors, and the two which are crosslined divided their votes between the nen. The white areas represent nonvoting territories.

ɔcratic nominee, made a personal canvass e entire country, whereas McKinley re- ɜd at his home at Canton, Ohio. During ɔurse of the campaign, however, the latter ɜred about 300 speeches from the porch ı house. This unusual form of campaign- ɜas adopted largely because of the illness rs. McKinley, an invalid. The devotion cKinley to his wife was one of the finest s in his life. After his election to the dency he continued to show the same af- ınate regard for her, and whenever she oo ill to leave her room he had his desk d in, so that he might be near her.

ɜ **Administration of William McKinley** -1901). One of McKinley's first acts as dent was to call Congress in extra session ɜise the tariff. The result was the Dingley a strongly protective measure which be- a law on July 24, 1897 (see TARIFF). In the President appointed a commission to tigate international money standards, but nothing came of its investigations. Far more important were the international problems of a political nature which the President then had to face. The annexation of the Hawaiian Islands had long been debated, both in and out of Congress, and was finally effected in 1898. The islands were organized into a territory of the United States on June 14, 1900. About the same time disturbances in Samoa made it advisable to end the joint protectorate which had extended over this group, and in 1900 Tutuila and several smaller islands became the property of the United States.

Spanish-American War. By far the outstanding feature of McKinley's administration, however, is the war with Spain (see SPANISH-AMERICAN WAR). In his inaugural address President McKinley had advocated nonintervention in Cuba, and for a year labored to avert war. Public indignation, however, was aroused by the attitude of the Spanish officials, and the destruction of the battleship *Maine* on February 15. The President at length submitted the questions at issue to Congress, which in April declared unhesitatingly that the Cubans were free and demanded the withdrawal of Spanish troops from the island.

The war which followed was not a great war, measured either by wars which preceded or followed it, but it brought an entirely new set of problems to the President and Congress. The war marks an epoch in the history of the United States. It made the United States a world power in a new sense, for it brought the country into new contact with international politics. At the same time it drew attention to new commercial possibilities, and particularly, by the acquisition of the Philippine Islands, gave the United States a vital interest

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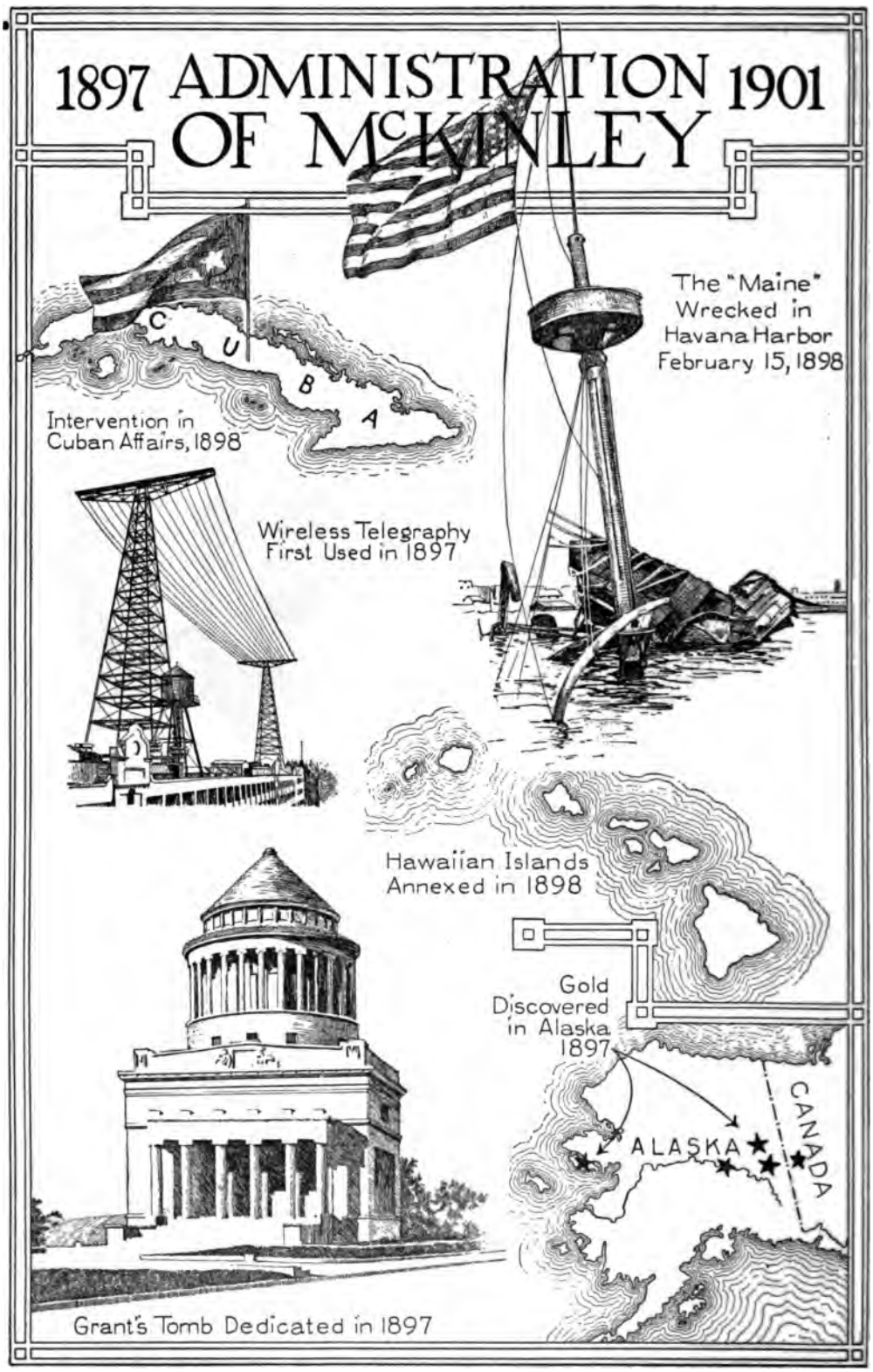

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in Asiatic conditions. A renewed demand for a canal across the Isthmus of Panama was still another result of the war (see HAY-PAUNCEFOTE TREATY; PANAMA CANAL). During the remainder of his term the President's efforts were centered on the organization and maintenance of government in Cuba, and on the preparation of the Cubans for self-government. In the Philippine Islands, the native insurrection, which was led by Aguinaldo (which see), was suppressed, and through the efficiency of Judge William H. Taft and the other administrators selected by the President, the greater portion of the new United States possessions were being governed peaceably within a short time after the conclusion of the war.

The Antitrust Movement. The organization of great corporations, aiming to secure monopolies, was one of the most disquieting tendencies in the last decade of the nineteenth century (see TRUSTS). Many large corporations formed at this time were not "trusts" in the accepted sense, but the public looked with suspicion on any large industrial organizations. One evidence of this distrust was a flood of state laws regulating the formation of large corporations and prohibiting the organization of monopolies. This tendency toward the concentration of capital received a decided check as a result of the decision of the Supreme Court in the case of the United States vs. Trans-Missouri Freight Association, a combination of Western railroads.

Other Events. The year 1900 was marked by three events of the first importance. One of these was the Gold Standard Act, making the gold dollar the standard of value in the United States. This act, which became a law on March 14, 1900, gave a legal definition to a condition which already existed. A second event, important for its result rather than in itself, was the Galveston flood. The flood caused great loss of life and property, but out of it arose a political innovation, the commission form of municipal government (see COMMISSION FORM OF GOVERNMENT). A third event was the Boxer Rebellion (which see). The action of the United States in joining the European powers in their demands on China was a further proof that the isolation of the United States was a thing of the past. American warships were sent to Chinese waters, and Americans marched through the sacred "Forbidden City."

Election of 1900. At the Republican National Convention, held at Philadelphia, on June 19, 1900, President McKinley was renominated by acclamation. For Vice-President the convention chose Theodore Roosevelt, of New York. Two weeks later the Democrats nominated Bryan and Adlai E. Stevenson, who had been Vice-President with Cleveland, and declared for free silver and against imperialism. By "imperialism" they meant the policy of colonial expansion. The Republican candidates benefited from the remarkable prosperity which had prevailed in the United States since the previous election, and appealed to the voters with "Four years more of the full dinner-pail," and similar slogans. The election resulted in a sweeping victory for the Republican candidates. McKinley and Roosevelt received 292 electoral votes as against 155 for Bryan and Stevenson. The popular vote was 7,219,530 for the Republicans; 6,358,071 for the Democrats.

McKinley's Second Term. The second term began on March 4, 1901. A few weeks later Aguinaldo was captured, and took the oath of allegiance to the United States, and in June the second Philippine Commission formulated a code of laws for the islands. Military rule then came to an end. Cuba had already adopted a constitution, and in July free trade was established with Porto Rico. The right of Congress to regulate trade between the United States and the newly acquired dependencies was affirmed by the Supreme Court in the so-called "Insular Cases" (1900), which are among the most important constitutional decisions ever made by that body.

The prosperity of the country since his accession to office seems to have worked a change in McKinley's views on the tariff. Through his public career he had stood consistently for a high tariff, but on September 5, 1901, in an address at Buffalo, N. Y., he expressed the hope that "by sensible trade relations which will not interrupt our home production, we shall extend the outlets for our increasing surplus. . . . The period of exclusiveness is past."

The President was in Buffalo for the purpose of visiting the Pan-American Exposition. On the sixth of September, the day following this address, he held a public reception at the exposition in the Temple of Music. Hundreds of people were in line to shake hands with the Chief Magistrate. One of these, Leon Czolgosz, an anarchist, advanced to meet the President with a revolver concealed in a bandage around his right hand. As he drew near, he fired, the bullet lodging in the muscles of the President's back. President McKinley was removed to the

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posing fountains. Through the medium of bronze and marble he has given life to old myths, and has idealized Grecian heroes, nymphs and dancing fauns. The *MacMonnies Fountain* for the Court of Honor at the Columbian Exposition, held in Chicago in 1893, won him lasting distinction. No poet ever took more pains than MacMonnies to secure fitting and precise expression for his ideas. Before submitting the new public fountain for Denver he made and destroyed five earlier models. His statue of *Sir Harry Vane,* in the Boston Public Library, and of *Shakespeare,* in the Congressional Library at Washington, are two of his other famous works. MacMonnies was born in Brooklyn, and at the age of three began to show signs of artistic genius. At that time he modeled horses with crumbs of bread and lumps of wax and painted flowers. He studied first under Saint Gaudens, and later went to Paris. He now lives in France, in the retirement which he courts and loves. MacMonnies has also shown great ability as a painter. The reader will find an admirable appreciation of this eminent sculptor in Lorado Taft's *History of American Sculpture.*

MacNAB, Sir Allan Napier (1798-1862), a Canadian soldier and statesman, for many years one of the leading Conservatives in the old legislative assembly, and from 1854 to 1856 joint Premier with Auguste N. Morin. The MacNab-Morin Ministry, although not a long one and not considered especially strong, was responsible for some of the greatest legislation on the statute books of Canada. MacNab is not one of the greatest figures in Canadian history, but circumstances made him a leader at times when history was being made.

MacNab was born at Niagara, Ont. While he was still a boy in school, the War of 1812 stirred his desire to show his loyalty to his country, and in 1813 he enlisted in the British navy as a midshipman. He soon left the navy and served in the army during the remainder of the war. After peace was declared MacNab began to study law and was finally admitted to practice. He first came into the public eye in 1830, when he refused to testify in regard to disturbances in Hamilton following a parade of Sir John Colborne's effigy through the streets. In the same year he was elected to the assembly for Upper Canada, and from 1837 to 1841 was speaker of that body.

As colonel of militia MacNab took a conspicuous part in suppressing the Rebellion of 1837. He was in command at Niagara when the *Caroline,* an American boat, was armed and used to assist the rebels. By his orders the boat was seized, set afire, and allowed to plunge over Niagara Falls. For his services during the rebellion he was knighted. After the union of the two Canadas in 1841 Sir Allan was leader of the Conservative opposition in the assembly until 1844, when the Liberals were defeated in the general elections and he was elected speaker. In 1845 he introduced the Rebellion Losses Bill, which was aimed to compensate those persons who had suffered a loss in property during the Rebellion of 1837 in Upper Canada. This bill met great opposition. It was said to place a premium on rebellion, and finally caused the downfall of the Conservatives in 1848. In that year Sir Allan's service as speaker came to an end. He continued, however, to sit in the assembly, and in 1854, on the resignation of Sir Francis Hincks, was called on to form a Ministry.

The new MacNab-Morin Ministry at once took up several great obstacles to progress in Canada. Two of these, the clergy reserves and seigniorial tenure, demanded quick action, and the bills providing for the secularization of clergy reserves and the abolition of seigniorial tenure passed the assembly on the same day. To John A. Macdonald, then attorney-general, belongs the chief credit for these measures (for clergy reserves see Ontario, subhead *History;* for seigniorial tenure, see Quebec [province], subhead *History*). After his resignation from the Premiership MacNab was created a baronet, and spent three years in England, but in 1860 returned to Canada and was immediately elected to the legislative council. During the session before his death he was speaker. W.F.Z.

MACON, *ma'kon,* Ga., the county seat of Bibb County and one of the most rapidly growing manufacturing centers of the South. It is situated on the Ocmulgee River, only six miles from the geographical center of the state; locally it is called the *Heart of Georgia.* By rail Atlanta is eighty-three miles northwest, Augusta is 125 miles northeast, and Savannah is 191 miles southeast. Through the service of the Georgia Southern & Florida; the Southern, Macon & Birmingham; the Georgia, Macon, Dublin & Savannah; the Macon & Birmingham, and the Central of Georgia railways it ranks next to Atlanta as the railroad center of the state. The river is navigable from Macon to the sea throughout the year. Negroes form thirty-five per cent of the population, which increased from 40,665 in 1910 to 45,757 in 1916

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(Federal estimate). The area exceeds nine square miles.

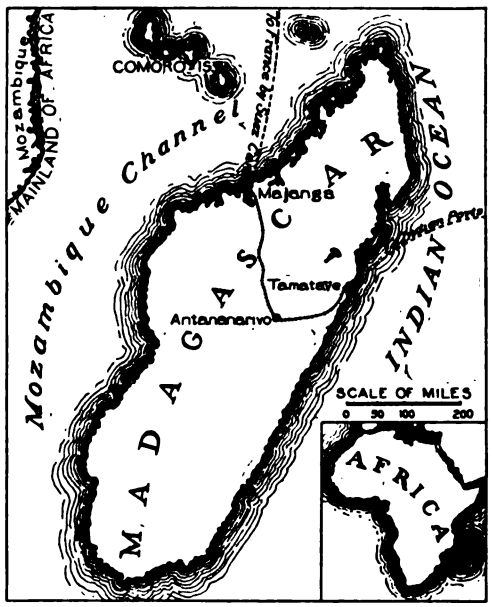
Commerce and Industry. Seven miles above the city the river has a fall of ninety feet, furnishing ample power for manufacturing purposes. Macon lies in the midst of a rich agricultural district which produces cotton, fruit and vegetables. As an inland cotton market it ranks fourth in the United States; the cotton manufacturing industry is rapidly growing and promises to rival that of Northern cities; its various factories employ about one-quarter of the city's wage earners. Next in importance are the manufactories of cottonseed products, which include cottonseed oil, cottonseed meal and cake, compound lard and soap. The lumber and planing-mill products, too, are important, and the manufacture of bricks exceeds that of any other city in the southeast. The largest vein of kaolin in the United States is found within a few miles of Macon, and there are forests of yellow pine and hardwood and hills of granite in the vicinity. Macon is located on the border of the noted Georgia peach belt and ships great quantities of peaches and other fruits each season. The city has the largest greenhouses in the South.

Buildings and Institutions. In addition to the public school system and two libraries, Macon's educational enterprises include Wesleyan Female College, the oldest chartered female college in the world (1836); Mercer University (Baptist); Saint Stanislaus College (Roman Catholic); Mount De Sales Academy, and the State Academy for the Blind, which has an extensive library. Noteworthy buildings are the $306,000 Federal building, erected in 1908, the handsome city hall and auditorium, a $500,000 hotel, the Y. M. C. A. building, Saint Joseph's church, a Home for Aged Masons and the Union passenger station, completed at a cost of $1,000,000.

History. The site occupied by Macon was visited by Hernando De Soto in 1540. In the same year this was the scene of the first Christian baptism in America and of the firing of the first cannon on American soil, so far as known. In 1822 the first settlement was made; the following year it was incorporated as a town, and in 1832 a city charter was granted. It was named in honor of Nathaniel Macon, an American political leader. W.H.C.J.

MADAGASCAR, *mad a gas' kar,* the largest island in the west Indian Ocean, a country of many half-civilized tribes. It is the third largest island in the world, having an area of 228,000 square miles, nearly as great as that of the Canadian province of Alberta, and four times that of the state of Michigan. Its length is equal to the distance between New York and Chicago, and in width it would extend from Milwaukee to Saint Louis. The island is owned by France.

Madagascar is divided into three distinct parts as to its surface features. The *eastern region* is mountainous, having short rivers, marshy valleys and frequent rains. There are dense forests of bamboo and rosewood, filled with ferns and hung with parasitic orchids. The



raphia palm, so useful to the native for his buildings, the cocoanut palm, papaws, mangoes and tanghinia are abundant. The east coast is very regular, having only three places of access for ships. Its many shallow lagoons are the fishing grounds of the natives. Tamatave has one of the few good harbors. The *central region* is a saucerlike plateau of glittering red clay, broken by cone-shaped volcanoes and mountains containing gold, iron, copper, lead, silver and other minerals, though this great store of wealth has not been extensively developed. The *western region* is comparatively flat; there is a marked dry season, and the land is less fertile.

The animal life of Madagascar is unique, in that African beasts of prey are not found here, as would be expected, owing to the proximity of that continent, but numerous species of lemur are peculiar to the island.

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The People. Of the total population of Madagascar, less than one per cent are Europeans and Asiatics. There were in 1911 about 3,225,000 natives, belonging to seven different tribes, ranging in race and intelligence from the enlightened Hovas of Malayan origin to the Baras, a degenerate, warlike African tribe. The Hovas have adopted European customs, are cultivating the country and building up Madagascar's cattle trade. Though polygamy and fetish worship still exist (see FETISH), many of the natives have adopted Christianity. The Europeans are developing manufacturing industries and extending the railroad, telegraph and telephone systems. Wagon roads have been built between the chief cities; there is postal communication throughout the island, and cable communication with Africa, besides three government wireless stations. Commerce with France is growing in importance; of the 10,086 vessels entering the port of Tamatave in 1913, nearly 6,900 were French. Primary education has been made compulsory, and besides more than twenty schools for Europeans, there are nearly 650 native schools.

Government. Madagascar is governed by the French Governor-General, and an administrative council at Antananarivo, the capital. Natives are employed to a large extent as local governors and chiefs of districts. There is no elective assembly and no representation in French Parliament. The natives have district courts, with the right of appeal to higher tribunals, and finally to the Governor-General.

History. No one knows how long Madagascar has been inhabited by its scattered, warring tribes. They jealously guarded their territory, and with the exception of some early Arab settlements, colonization has been of recent date. The turbulent chieftains were united into one kingdom in 1810 by Radama I, their one great king. After his death the native sovereigns proved the inability of the black race to govern themselves and the French colonists brought about intercession by the European powers. In 1890 England recognized the French protectorate of Madagascar (see PROTECTORATE), but the natives stubbornly refused to submit. After troops were sent to the island to enforce the French claims, the ruling queen was deposed, and in 1896 Madagascar became a colony of France; since then there has been a rapid development of its resources and its people. E.B.P.

Consult Matthews' *Thirty Years in Madagascar.*

MADDER, *mad'er,* a group of plants native to the warmer parts of both hemispheres, formerly of great economic importance because of the coloring matters, alizarin and purpurin, found in their roots. Owing to the recent development of the artificial manufacture of alizarin (which see), madder preparation have been almost eliminated. The most important species of the plant is *dyer's madder,* cultivated in European countries, in the East Indies and in China. It flowers year after year, producing small greenish-yellow blossoms, black fruit and rough, prickly leaves. From the roots of a species cultivated extensively in Holland is obtained the much-admired Turkey red dye. By the use of a mordant (which see) madder colors varying from pink through red and yellow to purple and brown may be obtained.

MADEIRA, *ma de'ra,* an island off the northwest coast of Africa in the North Atlantic Ocean, the largest of the Madeira group, all of which belong to Portugal. It is 620 miles southwest of Lisbon, Portugal, and 280 miles north of Teneriffe, in the Canaries. It is about thirty-eight miles long and twelve miles wide, and has an area of 315 square miles. The mountain range which extends across it rises gradually from the shore to its highest point, the Pico Ruivo, 6,050 feet above the sea; the average peak elevation of the mountains is 4,000 feet. The snow-crowned summits of the highest peaks lend an element of grandeur to the picturesque beauty of the island, with its many deep valleys and steep and rocky shores.

Madeira abounds in date palms, bananas, Indian corn, custard apples, figs, pomegranates, sugar and coffee. The grape disease has interfered greatly with the principal industry of the island in recent years, and the export of wine is less extensive than in former years. The climate, which is famed for its constancy and healthfulness, attracts many who suffer from diseases of the chest; the temperature differs only 10° between winter and summer. Funchal, which has a population of about 25,000, is the capital and the port of the island. The inhabitants are of mixed Portuguese, negro and Moorish descent; they are strong and industrious, but the majority are uneducated.

The Portuguese word *madeira* means *timber,* and the island is so called on account of the abundant forests which formerly covered it. Madeira was discovered by the Portuguese in 1420, and its colonization was soon begun under the direction of Prince Henry the Navigator. Population, 1911, 169,800.

MADEIRA RIVER, a majestic river of South America, the largest tributary of the

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Amazon River. It is formed by the union of several smaller rivers on the boundary between Brazil and Bolivia, and its general direction is northeast. Its principal tributary is the Rio Teodoro, formerly the Rio Duvida (River of Doubt), which was made known to the world by the Roosevelt-Rondon scientific expedition in 1914. This latter stream, 1,000 miles long, had previously been known to the natives, but Theodore Roosevelt was the first white man to explore it. The Madeira River is about 2,000 miles long, and at its mouth is nearly two miles wide and sixty-five feet deep. It is navigable up to a point about 480 miles from its mouth, where magnificent cataracts occur; beyond this point navigation is again resumed. It is named Madeira, which is Portuguese for *wood,* because of the quantity of driftwood sent down by the current.

MADERO, *mah da'ro,* FRANCISCO (1873-1913), a President of Mexico following his leadership of the revolutionary movement which deposed Porfirio Diaz, who had been at the head of the government for more than a generation. Madero was born in San Pedro, of a wealthy family which gave him a good education. He was a liberal in politics and always an idealist. Having become interested in politics as a result of fraudulent elections in 1903 and in 1908, he published a book in which he attacked the policy and administration of President Diaz. The book was immediately suppressed, but his open attack made him the only possible candidate against Diaz in 1910, and the supporters of the president promptly had him arrested on absurd charges, on June 27, 1910. He was released too late to take part in the election, but immediately issued *The Plan of San Luis Potosi,* advocating effective suffrage and no reëlection, but appealing for an uprising. He was forced to flee to the United States, but his adherents opened the revolution and Madero returned to direct the campaign. He was successful, and Diaz, seeing the futility of further resistance, finally made peace in May, 1911.

In October Madero was unanimously elected President, but throughout his administration he was harassed by revolutions. General Huerta, commander of the government troops, deserted him, and in 1912 Madero and the Vice-President were arrested and forced to resign. On February 23, 1913, while being transferred from one prison to another, they were both murdered. No satisfactory explanation of this outrage was offered, but it is generally understood that Huerta instigated the act.

Related Subjects. The reader is referred to the following articles in these volumes

Diaz, Porfirio
Huerta, Victoriano
Mexico, subtitle *History*

MADISON, JAMES (1751-1836), an American statesman, one of the ablest of the younger men who were conspicuous during the Revolutionary War and the period following it, one of the contributors to the *Federalist,* "Father of the Constitution," author of the Virginia Resolutions, Secretary of State for the eight years of Jefferson's Presidency, and finally himself President of the United States. Madison is not one of America's popular heroes. Even in his own lifetime, although his ability won cordial recognition and confidence, he did not win the affections of the people to the degree, for example, to which Jefferson did. His reputation suffered, moreover, from the misfortunes which befell American arms in the War of 1812, and it has never fully recovered. Yet Madison's career is one of the brightest in the early years of the United States, and his fame will never perish, if for no other reason than that he was the "Father of the Constitution." He was not an intrepid statesman, but "his calm good sense," as the historian Ticknor says, "and the tact with which he could adapt theory to practice were among his prominent characteristics." Jefferson said of him that "with consummate powers was united a pure and spotless virtue." In practice he sometimes fell a victim to party politics, but in theory he was just and keen. He was a clever diplomat, a graceful

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writer, a man of varied and expert wisdom, a good friend and a faithful officer of the government.

His Youth. James Madison was born at Port Conway, King George County, Va. His father, a man of some local reputation, was a landowner and had served in various minor county offices. Young James had the advantage of considerable instruction at home, and in 1769 entered the College of New Jersey (now Princeton University). At college he was a keen student of ancient governments. He was graduated in 1771 and spent the next year in graduate study. Returning then to his father's house he continued his voluminous reading in history and constitutional law, his object apparently being to prepare himself for public life. In 1774, when he was only twenty-three years old, he accepted his first political appointment, a membership of the Committee of Safety of his county. For more than forty years thereafter, except for one brief interval, he was continuously in public office.

Long Service as a Legislator. In 1776 Madison was a delegate to the Virginia convention and a member of the committee to draft a state constitution. In the work of this committee he rendered valuable assistance to Thomas Jefferson in his effort to secure complete religious toleration. After the adoption of the constitution Madison was elected to the first general assembly, and in 1777 was given a place in the council of state by Patrick Henry, who was then governor. By 1780 his prestige had grown to such a degree that he was chosen as one of Virginia's delegates to the Continental Congress. In the Congress he was conspicuous. Still young, but prudent, sagacious and acute, he was a statesman of a high order, and in influence was second to none. His voice was authoritative on the tremendous problems, both internal and external, which were vexing the newborn nation. He insisted that Spain permit free navigation of the Mississippi River by American vessels, opposed the further issue of paper money by the states, and strongly urged the extension of the powers of Congress. In 1781, when Congress was appealing to the states for power to impose a small duty—five per cent—on importations, to add to the government's meager funds, Madison spoke with a scholar's calm in support of the measure. "It is needless," he said, "to go into the proofs of the necessity of paying the public debt; the idea of erecting our national independence on the ruins of the public faith and the national honor must be horrid to every mind which retains either interest or pride."

From 1784 to 1786 Madison served in the Virginia assembly, but in 1787 was again elected to the Continental Congress, and in the same year was a delegate from Virginia to the Constitutional Convention at Philadelphia. In that body he rendered such noteworthy service that he became known as the "Father of the Constitution." He was the author of the "Virginia plan," which provided that representation in both branches of the national legislature should be on the basis of population. This plan was defeated, but Madison was instrumental in forcing the delegates from the smaller states to accept representation by population for the House of Representatives. After the adjournment of the convention Madison performed a service perhaps even more valuable—the writing of the *Federalist* in coöperation with Alexander Hamilton and John Jay. About one-third of these essays were written by Madison (see FEDERALIST, THE). In addition to his other work in the convention Madison took notes on the debates, thereby creating an invaluable record in the constitutional history of the United States.

JAMES MADISON
First "war President" of the United States.

On his return to Virginia from Philadelphia Madison was chosen a delegate to the state convention which was to vote on the adoption of the new Constitution. He led the supporters of the Constitution, and secured its ratification. The Anti-Federalists, however, were

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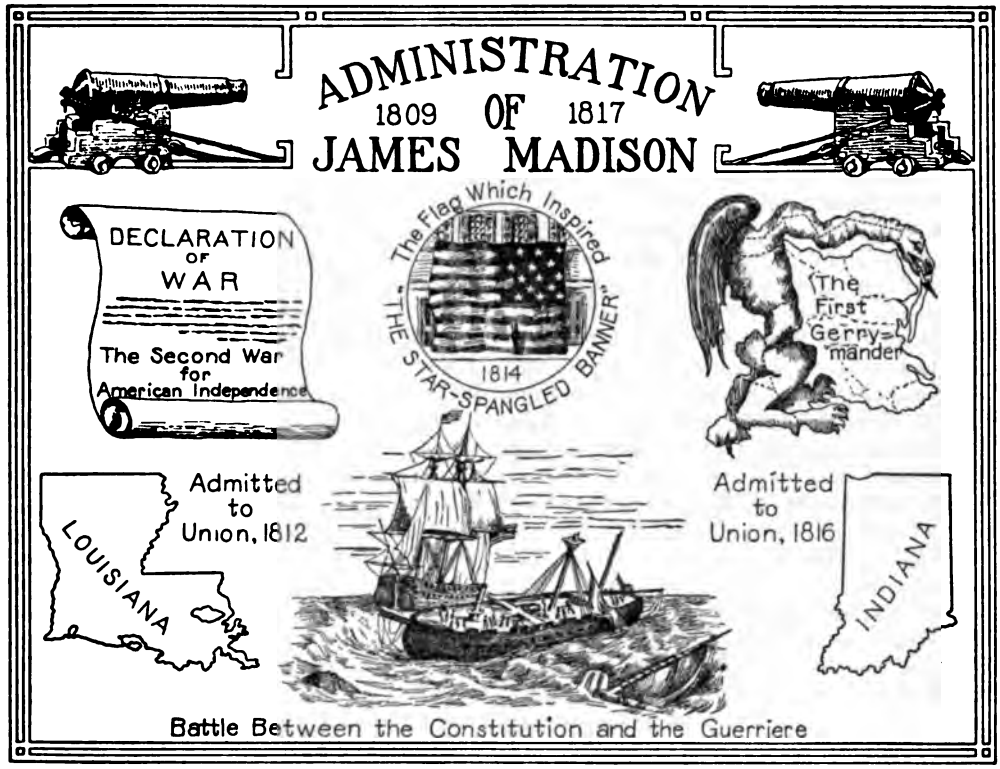

strong enough to prevent his election to the Senate, but he was elected to the House of Representatives, his opponent being James Monroe. During the eight years of Washington's Presidency, 1789-1797, Madison served in the House. At first a Federalist, he later opposed many of the administration's policies and became the leading ally of Jefferson. Washington in 1794 offered him the Secretaryship of State, but the offer was declined because Madison was satisfied with his position in the House of Representatives. There the direction of business was left largely to him. He proposed the resolutions creating the departments of State, the Treasury and War, proposed a series of amendments to the Constitution out of which grew the existing first ten amendments, and had considerable voice in framing the first tariff act. In short, much of the principal legislation of the period was either drafted or introduced by him.

The Virginia Resolutions. For four years, 1797 to 1801, broken only by a few months of service in the Virginia assembly, Madison lived in comparative retirement at his home. During these years he wrote occasionally for the press, and made one remarkable contribution to political literature. This contribution is generally known as the Virginia Resolutions (see KENTUCKY AND VIRGINIA RESOLUTIONS), which were adopted by the Virginia assembly in 1798 as a protest against the Alien and Sedition laws in particular and the extension of Federal authority in general. These resolutions were transmitted to the authorities of the other states, and the replies of the latter were referred to a legislative committee of which Madison was chairman. It is worthy of note that of the seven states which replied only one, Vermont, denied Madison's view that the Union was a compact between sovereign states.

Madison as Secretary of State. For a number of years Madison had been regarded as Jefferson's chief lieutenant. It was natural, therefore, when Jefferson became President, for him to appoint Madison his Secretary of State. For eight years the latter directed the nation's foreign affairs with a wise and steady hand. This was a period of changing conditions, at home and abroad, which demanded constant watching.

By far the most troublesome problems which confronted Madison concerned the attitude of England toward certain accepted principles of international law. In dealing with these prob-

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lems, Madison's skill as a diplomat was of little avail, for the nations of Europe were engaged in a great war and were in no position to consider legal points. While the United States was endeavoring to maintain its rights the election of 1808 made Madison the fourth President. He was Jefferson's choice, and was easily elected, receiving 122 out of 175 electoral votes.

The Administrations of James Madison, 1809-1817. The problems which Madison had left unsolved as Secretary of State were now left for his consideration as President. Madison was well fitted to be President. From his college days he had been a student of law and government, and during his long career as a legislator had put many theories into practice. He had, moreover, received valuable training in handling international questions during his eight years' service as Secretary of State. From another point of view, the social side, Madison had the additional qualification of a charming wife. He married, in 1794, Dorothy Payne Todd, who, as "Dolly" Madison, became the leader of a brilliant society in Washington.

During the whole of Madison's administration, however, the shadow of war hung over the land. At the close of Jefferson's administration the attitude of France and England toward American shipping had already brought the relations of those countries with the United States to a critical point. Almost immediately after he entered office Madison had issued a proclamation forbidding all communication with France and England until those countries should repeal certain decrees and orders in council which interfered with American rights on the high seas. Practically the entire four years of Madison's first term were occupied in negotiations with those countries. The acts of both countries were arrogant, but France never advocated the policy of impressment of American seamen. The Republican party, the party of Jefferson and Madison, then in power, was traditionally friendly to France and hostile to England. The popular feeling against England was fanned by reports from the western frontier that English agents were attempting to arouse the Indians against the United States. Some color to these reports was given by Tecumseh's plan for an Indian confederacy. The resulting campaigns against the Indians, the rise of a new generation of Westerners who were determined to force the issue with England, and the other factors mentioned above—all combined to push Madison along the path to war, a path he was reluctant to follow.

The War of 1812. Finally, in 1812, after England had steadily refused to modify its policy, the United States placed an embargo for sixty days on all exports. This preliminary was followed on June 1, 1812, by a Presidential message to Congress in which were reviewed the many American grievances against England. The President concluded his message by recommending a formal declaration of war. On the eighteenth of June Congress acted on the President's recommendation. On the twenty-third of June, before news of the declaration of war reached England, the British government withdrew the orders in council to which the United States had objected. Efforts were then made, but in vain, to prevent the outbreak of hostilities.

A few months after the beginning of hostilities Madison was reëlected President by an electoral vote of 128 to 89 for De Witt Clinton of New York. Elbridge Gerry of Massachusetts was elected Vice-President. Already, however, Madison's reputation had suffered. There was strong opposition to the war in many sections, especially in New England, where it was customary to speak of "Mr. Madison's war." Madison not only had to endure the blame for a war which he had tried to avoid, but also for the failure of the American armies to win victories. At the outset the Americans suffered serious reverses, and had it not been for a number of glorious victories on the water the score would have been heavily against them. As it was, the treaty of peace, signed at Ghent on December 24, 1814, was ratified with suspicious promptness on the day after it was laid before the Senate. For details of military and naval operations, see WAR OF 1812.

Death of the Federalist Party. During the war there had been much economic and financial distress in the United States. The blockade had ruined shipping and all foreign trade, the Treasury was exhausted, and the nation's credit was most uncertain. The spectacle, too, of the President of the United States fleeing from a British army which sacked and burned the nation's capital, was not a pleasing one. The distress caused by the war and the consequent opposition to Madison's policies were greatest in New England, the Federalists' stronghold. The opposition reached its climax in the Hartford Convention (which see). The secrecy with which its proceedings were carried on led to rumors of disloyalty and brought public disapproval on the leading Federalists. The Battle of New Orleans, followed by the ratification

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OUTLINE AND QUESTIONS ON JAMES MADISON

Outline

I. His Youth

(1) Birth and parentage
(2) Education
  (a) Private study
  (b) College

II. Career as a Legislator

(1) Committee of Safety
(2) Virginia general assembly
(3) Continental Congress
(4) Constitutional Convention
(5) Congress of the United States

III. As Secretary of State

(1) Disputes with England

IV. His Administrations

(1) Madison's qualifications
(2) War of 1812
  (a) Its causes
  (a) Important battles
  (c) Internal problems involved
  (d) Hartford Convention
  (e) Treaty of Peace
    1. Question of impressment of seamen not settled
(3) Fall of the Federalist party
(4) Second Bank of the United States
(5) Internal improvements
(6) Tariff of 1816
(7) Louisiana and Indiana admitted

V. Madison's Last Years

(1) Interest in education
(2) Virginia constitutional convention
(3) Death

VI. Writings and Character

(1) *The Federalist*
(2) *Virginia Resolutions*
(3) *Advice to My Country*
(4) Estimates during his lifetime
(5) Later opinions

Questions

What was the *Federalist?* Of how great importance was it?

What was the Virginia Plan? What substitute for it was adopted?

What were the Virginia and Kentucky Resolutions? Who wrote them? Who was President when they were written?

Why was Madison not popular during his second term?

In what year did the British capture Washington? What was Mrs. Madison doing at the time? Why did they not capture the President?

Who succeeded Madison as President?

What were his good qualities? What were the weak points in his character? Are opinions of him to-day more or less favorable than they were during his lifetime?

What was *McCulloch versus Maryland?* Who was John Marshall, and what did he have to do with this?

What is meant by Orders in Council? What part did they play in the War of 1812?

What was the Berlin Decree? The Milan Decree?

Why did not the United States go to war with France as well as with England?

Why was Tecumseh's plan for an Indian confederacy a factor in causing the War of 1812?

What was the "impressment of American seamen?" How was the question dealt with in the Treaty of Ghent?

What important battle of the War of 1812 was fought after the treaty closing that war had been signed?

What future President commanded the American army in this battle?

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of the treaty of peace, further added to the unpopularity of the Federalists, and for years the term "Hartford Convention Federalists" was an epithet of reproach. The nation finally realized that the war had been fought in a just cause and that its conduct had not been wholly blameworthy.

Nationalist Tendencies. It is a paradox, but nevertheless true, that the war caused the death of the Federalist party, an organization of nationalist tendencies, but it also compelled the Republicans to adopt these same nationalist political ideas. For a time after the end of the war the country had only one political party, whose principles were derived from those of the two older parties. The general recognition of the broad powers of the Federal government was shown in various ways. First there was a vigorous effort to strengthen the means of national defense. Next there was the chartering of the second Bank of the United States (which see) in 1816, a measure which Madison approved. In the same year Congress began to appropriate large sums of money for public roads and other "internal improvements" which were more or less local in character. On the propriety or wisdom of such appropriations Madison differed from his party. Still another symptom was the tone of judicial decisions, especially the opinion of Chief Justice Marshall in the case of *McCulloch versus Maryland,* in which he gave a clear definition of the relation between the Federal and state governments and stated in detail the court's theory of the supreme and exclusive authority of the former.

One of the most important evidences of the new nationalist spirit was the passage of the first really protective tariff, that of 1816. It was natural that the patriotism called forth by the period of embargo, nonintercourse and war should be followed by a disposition to encourage domestic manufacture of the articles whose foreign supply had been cut off. Madison's views on this subject, as on others, shifted from time to time, but in 1816 he recommended a protective tariff for the encouragement of manufactures. There was as yet, however, neither in Congress nor among the people, a sentiment in favor of permanent protection. There was rather a feeling that assistance should be granted to the manufacturing industries which had arisen during the war. The tariff of 1816 increased the general average of duties to about twenty per cent, as a means of providing interest on the heavy debt caused by the war, and placed higher duties on textile fabrics.

Quiet and Leisure of Old Age. Madison was succeeded as President by James Monroe, who was Madison's Secretary of State, just as Madison had served Jefferson, his predecessor. Monroe received the electoral votes of all but three states, which voted for Rufus King, the last Federalist candidate for President. At the conclusion of his term Madison retired to his home at Montpelier, Va., where he died on June 28, 1836. In his later years he took much interest in education, and was especially eager to develop the University of Virginia. His last public service was as a member of the Virginia constitutional convention of 1829. To the end he remained a distinguished figure, and his wife's charm and the hospitality of their home helped to sustain his prestige. Mrs. Madison survived her husband until 1849. W.F.Z.

Consult Gay's *James Madison,* in American Statesmen Series; Hunt's *Life of James Madison.* John Quincy Adams wrote *The Lives of James Madison and James Monroe,* a valuable book which is still in print.

MAD'ISON, Wis., the capital of the state, the county seat of Dane County and a noted seat of learning, situated in the southern part of the state, about midway between the eastern and western borders. Milwaukee is seventy-five miles east, Chicago is 130 miles southeast and Saint Paul is 268 miles northwest. Three trunk lines serve the city, the Chicago & North Western; the Chicago, Milwaukee & Saint Paul and the Illinois Central railways. In 1916 the population was estimated by the Census Bureau to be 30,699; in 1910 it was 25,531. The area is a little less than six square miles.

Lakes and Drives. Few cities of the United States possess as great natural beauty as Madison enjoys, from its unique location between Lake Mendota (Great Lake) and Lake Monona (Spirit Lake), 845 feet above sea level and 210 feet above Lake Michigan. These two lakes are part of a chain of four lakes linked by the Yahara River; Waubesa (Swan) and Kegonsa (Fish) lakes, complete the chain. Longfellow, in his tribute to "The Four Lakes of Madison," described them in part as—

> "Four lovely handmaids that uphold
> Their shining mirrors rimmed with gold,
> To the fair city of the West."

Seldom does an inland city have so extensive a water front. Above this level, hills and bluffs covered with trees and shrubs rise to an elevation of from forty to 125 feet, and wherever possible this natural beauty has been improved

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upon in the parks, which cover 500 acres, and in the miles of remarkable drives about the lakes.

Buildings and Institutions. The city's most attractive ornament is the Capitol, which stands on a hill in the center of a public park, and which for architectural beauty is not surpassed in any other capital city of the United States. Among other prominent buildings are those of the University of Wisconsin, established in 1848 and open to both sexes. This great institution occupies a beautiful site on a tract of land 600 acres in extent, which stretches for one mile along the picturesque shores of Lake Mendota. The State Historical Society is housed in an Ionic structure of Indiana limestone, the construction of which cost $700,000. It contains a valuable collection of historical mementos and the famous reference library of 245,000 volumes, considered one of the best historical libraries in the United States. The libraries of the Wisconsin Academy of Sciences, Arts and Letters and of the State University are also in this building. In addition to these, the city has the State Law and Carnegie libraries, four schools of music, business schools and night schools. The Federal building was erected in 1871. A United States weather bureau station and a forest-products laboratory are located here. In the immediate vicinity are the Sacred Heart Convent, for girls, the State Insane Asylum, a Battle Creek sanitarium and the State Fish Hatchery. See WISCONSIN, UNIVERSITY OF.

Commerce and Industry. Though Madison is widely known as a seat of learning and as a summer resort, its varied industries are also important. The 120 manufacturing houses supply local and foreign markets, and the annual output is valued at about $10,000,000. Among these products are agricultural implements, machine tools, gas and oil engines, lubricating devices, electric supplies and building materials. Owing to its geographical location between Chicago and the Twin Cities, Minneapolis and Saint Paul, and to the exceptional shipping facilities offered by nine branches of the three trunk lines serving the city, Madison has become a distributing center of importance. It is a wholesale lumber point and occupies the center of the tobacco-growing region of the state. The surrounding territory also produces lead, zinc, iron ore, grain, silica, sand and flax.

History. In 1836 this site was chosen for the state capital, and in 1837 the first house was built and occupied by the workmen engaged in the construction of the Capitol. Two years later the building was completed, and Madison has since been the seat of government for the state. It was incorporated as a city in 1846, and named for James Madison, fourth President of the United States. A.H.M.

MADON'NA AND HER BABE, the most revered subject in the world of religious art as well as in the world of reality. In the Madonna of art is found the glorification of the motherhood and mother love of the race. As nothing else makes so universal an appeal as a mother and child, century after century artists have poured out their souls in this beloved theme. Madonna paintings are so numerous that it is impossible to estimate their number. Every gallery of any consequence has its study of Mary and her Babe, representative of some great school of art. However, the greatest Madonna paintings are of the Renaissance, that marvelous period of the awakening of art, religion and learning in which the medieval age merges into the modern. The Madonnas of to-day are comparatively few in number, for the men and women of the twentieth century are more concerned with men than with saints; their interest centers not upon the hereafter, but the present. And so their art concerns itself not with painting virgin mothers, saints and angels, but with the things that lie close to material existence.

Students of Madonna art generally divide the paintings into five classes, according to the general styles of treatment:

(1) The *Portrait Madonna,* in which the figures are in half length against an indefinite background. In this division are grouped the first Madonna paintings. They are of Byzantine or Greek origin, and an example is to be found in every old church in Italy. The Virgin is a half-length figure against a background of solid gold-leaf, or studded with cherubs. She is pictured in a robe of blue, starred or marked with gold and usually draped over her head. To see one is to know all.

(2) The *Madonna Enthroned,* which constitutes the largest class, represents the Madonna sitting on some sort of throne or dais. Every school of Italian art is also included in this division, and an astonishing variety of form is revealed. To this group belong Cimabue's *Madonna,* painted in 1270, and hanging in the Church of Santa Maria Novella, at Florence; Bellini's *Madonna of San Zaccaria* at the Venice Academy; Andrea del Sarto's *Madonna of the Harpies,* in the Uffizi Gallery, Florence; Perugino's *Madonna and Saints,* in the Vatican Gallery; Paul Veronese's *Madonna and Saints,* in the Venice Gallery, and *Madonna and Child* by Quinten Massys, in the Berlin Gallery.

(3) The *Madonna in the Sky,* or the *Madonna in Gloria,* where the figures are set in the heavens, represented by a glory of light, by clouds, or a company of cherubs, or by simple elevation above

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the earth's surface. The glory was originally set in a sort of nimbus, surrounding the entire figure instead of merely the head; it was generally oval in shape. Representative paintings of this class are Raphael's *Sistine Madonna,* in the Dresden Gallery; Fra Angelico's *Madonna della Stella* in the monastery of San Marco, Florence; Correggio's *Madonna of Saint Sebastian,* in the Dresden Gallery; Moretto's *Madonna of San Giorgio Maggiore,* at Verona; Bouguereau's *Madonna of the Angels.*

(4) The *Pastoral Madonna* has a landscape background, of which Raphael again heads the list with his *Belle Jardiniere* (The Beautiful Gardener) of the Louvre Gallery, *The Madonna of the Meadow* in the Belvedere Gallery, Vienna, and the *Madonna of the Goldfinch,* of the Uffizi, Florence. Among other famous paintings of this division are Leonardo da Vinci's *Madonna of the Rocks* in the National Gallery, London; Palma Vecchio's *Santa Conversazione,* at the Dresden Gallery, and Filippino Lippi's *Madonna in a Rose Garden,* in the Pitti Palace, at Florence.

(5) *Madonna in a Home Environment,* which forms but a small group. The Northern painters, home loving in their tastes, idealized the type, and we find in this list Quinten Massys' *Madonna,* presenting a Flemish bedroom of the fifteenth century; Schongauer's *Holy Family,* in the Belvedere Gallery, at Vienna, and Rembrandt's *In a Carpenter's Home* in the Munich Gallery.

Legend credits Saint Luke with having painted the first Madonna. But it was not until after the Council of Ephesus, in A. D. 431, that paintings of the Virgin and her Babe became the recognized symbols of the orthodox faith, and Madonnas began to increase in great numbers. The oldest representations of the Virgin that survive are those found in the catacombs accompanying the tombs of the early Christians. Byzantine models were followed up to the thirteenth century, when, with the dawn of the Italian Renaissance, the old-style portrait Madonna passed out of vogue. More elaborate backgrounds were introduced with the growing resources of technique. This was the time of Cimabue of Florence, the father of modern painting. He was the first to put natural life into the angular designs of the Byzantine artists, and with him began that wonderfully productive period of Italian art, with Madonna subjects as the chief source of inspiration, culminating in Raphael's great *Sistine Madonna.* Raphael is the world's greatest painter of Madonnas. His masterpiece, the *Sistine Madonna,* painted in 1518, now hangs in the Dresden Gallery. Its theme is the transfiguration of loving and consecrated motherhood, and represents the Virgin supported on clouds and carrying the infant Jesus in her arms. On one side Pope Sixtus II kneels in supplication. At the other side Saint Catharine kneels, and below, the two famous cherubs of Raphael are leaning. It was painted as an altar piece for the Church of San Sisto at Piacenza, and was finished just before the master's death. This Madonna is perfect in poise and character.

It is said that Raphael first painted his *Madonna of the Chair* upon a barrel and then copied it on canvas. It was painted in 1516 and now hangs in the Pitti Palace, Florence. The Virgin is seated in a chair, clasping Jesus in her arms, while Saint John is depicted in adoration at the left. His *Madonna di Ansidai,* painted in 1506, the finest in England, is in the National Gallery, London. It is sometimes called the *Blenheim Madonna,* because it was purchased there in 1844 for $350,000. In the *Belle Jardiniere* (Pretty Gardener), in the Louvre, the Virgin is seated in a meadow among flowers. She is looking at the Infant, who stands at one knee; at the other, Saint John kneels, holding a cross. Others of Raphael's fifty Madonna paintings are *The Madonna of the Goldfinch* of the Uffizi, Florence; *The Madonna in the Meadow,* in the Belvedere Gallery, Vienna; and the *Colonna Madonna,* the gift of Mr. Morgan to the Metropolitan Museum, New York City.

Leonardo da Vinci was doubtless Raphael's greatest inspiration, but the former is always mysterious and subtle, the latter frank and clear. Of Da Vinci's famous Madonnas, only two remain. His *Madonna of the Rocks,* in the National Gallery, London, takes its name from the appearance in the background of a grotto, with high rocks. The Virgin is presenting the infant John to Jesus, who, supported by an angel, is blessing him.

Correggio Madonna paintings are large compositions crowded with figures expressing great gladness and gayety. The fame of these rests not so much on their inner significance as upon their splendid technique; they are unsurpassed for masterly handling of color. Among his famous paintings are *Madonna of Saint Sebastian* in the Dresden Gallery; *La Zingarella* at Naples; *Madonna della Cesta* in the National Gallery, London; and the *Madonna della Scala.* The latter picture was originally painted in fresco over the eastern gate of Parma. Later the wall which it decorated was incorporated into a small, new church. To accommodate the high level of the Madonna, the building was somewhat elevated, and being entered by a flight of steps, was known as S. Maria della Scala (of the staircase). This name attached itself to the painting even after the church was

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oyed in 1812, and the fresco removed to own gallery.

ian ranks next to Raphael and Correggio portrayal of the Virgin. In his *Madonna Roses*, in the Uffizi Gallery, Florence, the holds his two little hands full of roses his cousin, Saint John, has brought him, he mother smiles gently at the eagerness e two children.

to return to the earlier schools. Fra oo Lippi, the gay artist-monk, was the first rtray the incarnation of mother love and sh innocence. Many of the famous art ies of Europe hold as their treasures Ma- paintings from his able brush.

vanni Bellini, of the Venetian school, is n throughout the world for his enthroned onnas. Of his painting for the chapel in Giobbe, but now hanging in the Venice emy, Ruskin said that it was "one of the est pictures ever painted in Christendom r central art power." It is a large compo- with three saints at each side and three sters below. His *Madonna between Saint ne and Saint Paul,* in the Venice Academy, ounted among the rare treasures of Italian

ticelli's *Madonna of the Pomegranate* in ffizi, Florence, shows the figures at half . The Virgin, encircled by angels, holds hild half reclining on her lap. Her face is s is characteristic of the Madonnas of this r, and the Child has absorbed her mood. artists of Northern Europe did not pro- many great Madonnas, and few now re- In their art the Virgin invariably wears wn, whether she sits on a throne or is d in a pastoral environment. Their fore- example is the celebrated Holbein Ma- of Darmstadt, known as the *Madonna of omaster Meyer,* now in the Dresden Gal- The Madonna wears a high, golden crown, ssed and edged with pearls. This noble sums up the finest elements in the Ma- of the North. Other Madonnas not to erlooked of this school are those by Van and the woodcuts of Albrecht Dürer.

rillo is the foremost representative of the ish school. He alone of the seventeenth ry kept alive the pure flame of religious r imbued by the devout Italians of the school. Examples of the best of his art o be found in the Pitti Gallery, Florence, n the Louvre, Paris

the modern [illegible] Boden- r, Bou[illegible] more- senting the Queen of Heaven as a full-length figure in the sky, but their conceptions lack the dignity of Raphael, the master. R.D.M.

Consult Karoly's *The Madonnas of Raphael;* Hurll's *The Madonna in Art.*

MADRAS, *ma drahs'*, the capital of the province of Madras, on the eastern coast of the Peninsula of India. It is the third city in size and importance of India, exceeded only by Calcutta and Bombay, and although it has a large sea trade its anchorage for vessels is poor. A great deal has been done to improve the harbor, yet it is so unsafe during the cyclones that occur so often on its coast that the larger ships are always warned to put to sea. In spite of this drawback Madras has a large trade in cotton, rice, coffee, hides and skins, a great many of these products coming from the interior on the three canals and the several railroads that center there.

Though the Portuguese founded the village of Saint Thome, now a part of Madras, in 1504, the city itself dates from 1639, when an Indian *rajah* granted some land to a British subject. A fortified factory was built, and soon a village grew up around it, which became the chief English settlement on the coast. With a large body of English and native troops and authorities and a customs house. Madras has two large universities, several fine churches, a large native hospital and many fine public buildings. Population, 1911, 515,[illegible].

MADRAS, a province in the southern part of British India, extending along the Bay of Bengal on the east, with a long, narrow strip touching the Arabian Sea on the west, and bounded by the provinces of Mysore, Hyderabad and Orissa on the north and northwest. It has an area of about 141,726 square miles, nearly equal in size to the combined area of Iowa and South Dakota, and over half as large as the province of Alberta. The Eastern and Western Ghats and the Nilgiri Mountains cover a great part of its surface, the remainder being a high plateau. The principal rivers are the Godavari and Kistna, with their tributaries, which, with the aid of irrigation, furnish enormous [illegible] of cotton, spices, sugar cane, [illegible] and tea. Besides its many [illegible] boasts of forests of valuable wood, [illegible] products, among which are iron, [illegible] net, diamonds and copper.

Early in the fourteenth [illegible] medans invaded the [illegible] British, French and Dutch [illegible] premacy, the former [illegible]

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undisputed possession. By the end of the nineteenth century revolts among the native tribes had been completely suppressed. The inhabitants of the province, numbering about 41,500,000, are under a governor, who is in turn under control of the British Viceroy of India. They live in small villages, each of a few hundred inhabitants, and have eight or ten languages, besides numerous dialects. Although a great

MADRAS

a—Kashmir
b—Punjab
c—North West Frontier Province
d—Rajputana
e—Bombay
f—Central India Agency
g—United Province of Agra and Oudh
h—Central Provinces
i—Berar
j—Hyderabad
k—Mysore
l—Bengal
m—East Bengal and Assam
n—Burma

proportion of the population is wholly uneducated, schools are beginning to gain a foothold. In 1911 and 1912 there were 5,752 males and but forty-nine females in the colleges, although there was not such a comparative difference in the numbers attending elementary schools. Madras University, a body of examiners, is at the head of educational institutions in the province and grants degrees in engineering, law, medicine and arts.

MADRID, *ma drid'*, a city situated on a high plateau, 2,150 feet above the sea, swept during the winter months by icy winds from the snow-capped mountains on the north and in summer exposed to a burning sun. It can lay its only claim to the honor of being the capital of Spain to its fortunate location in the central part of the peninsula. It is almost equidistant from the Mediterranean, the Atlantic and the Bay of Biscay, and in a direct line it is about 860 miles west of Rome and about 660 miles southwest of Paris. By way of Lisbon, Portugal, it is 3,350 miles from New York. Madrid is a very modern city, with but few landmarks of its medieval days. Its general aspect is clean, and an air of gayety pervades the city. Some one has said that the inhabitants include two classes—those who go to bed after 3 A. M., and those who get up before four. The streets are never quiet.

As compared with other capitals, Madrid has very few structures of much interest architecturally or otherwise. Of the secular buildings, the most magnificent is the royal palace, in Tuscan style, forming a square of 489 feet and enclosing a court of 140 feet. In conjunction with the palace is the royal armory, containing the finest military collection in the world, a reminder of the former glories of Spain, and the royal stables and coach houses, remarkable for their extent. Chief among the many squares, which form an attractive feature of the city, is the Prado, embellished with fountains and many fine groups of statuary. The royal picture gallery, built in 1785 by Charles III and situated in the Prado, is one of the finest in Europe. It contains over 2,000 paintings, including masterpieces by Velasquez, Murillo, Raphael, Rubens and Van Dyck. Another fine square is the Plaza Mayor, formerly the scene of bullfights. The present bull ring, in the eastern part of the city, dates from 1874 and has a capacity of 12,000 spectators. The opera house is one of the most beautiful in Europe. The National Library, founded by Philip V, contains over 600,000 volumes. Madrid has many schools and churches. The University of Alcala, founded in 1508, is very modern in extent and scope.

Madrid is a consuming rather than a producing center. Its manufactures, excepting tobacco, are of little consequence; almost every article of food and clothing is imported. The publishing trade is important. The old tapestry factory still does beautiful work, and the potteries at Moncola are producing clever imitations of the earthenware for which Spain once was renowned.

Chroniclers trace the existence of Madrid as far back as the tenth century, when it was a fortified post on the frontier of the Moorish kingdom of Toledo. It began to be a place of significance under Charles V. When, in 1561, Philip II made it the capital of Spain, it had a population of 30,000. Population in 1910, 571,539. R.D.M.

Consult Calvert's *Madrid: An Historical Description and Handbook of the Spanish Capital.*

MAELSTROM, *male'strom,* a swift and dangerous tidal current, famed in medieval and modern legends, which flows between two islands

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of the Lofoten group, lying off the northwestern coast of Norway. Between the tide level in the ocean and that in the West Fiord, which lies between Lofoten and the mainland, there is a very great difference, and every twelve hours a huge mass of water, moved from the fiord to the ocean and back again, runs with great swiftness through the many narrow island channels. Dangerous currents, therefore, develop, the swiftest being the famous Maelstrom, between the islands of Vaerö and Moskenaesö. This current becomes very dangerous when the wind blows against it between high and low tide; the sea then is whipped into a seething mass that would swallow up any small vessel venturing upon its waters.

Of the many stories woven about this current, none is more graphic than Edgar Allan Poe's *A Descent into the Maelstrom*. He describes it in these words:

> The vast bed of the waters, seamed and scarred into a thousand conflicting channels, burst suddenly into frenzied convulsion—heaving, boiling, hissing—gyrating in gigantic and innumerable vortices, and all whirling and plunging on to the eastward with a rapidity which water never elsewhere assumes, except in precipitous descents.

As a figure of speech the word is found in all modern literatures, and refers to any violent, overpowering force.

MAETERLINCK, *mah'ter lingk,* MAURICE (1864-), a Belgian poet, dramatist, naturalist, idealist and story-teller, the winner of the Nobel Prize for literature in 1911. His dramas, upon which his fame largely rests, include *The Blue Bird, Monna Vanna, Pelléas et Mélisande, The Intruder, The Blind* and *Home*. Though most of his plays are mystical and symbolic, and therefore not well adapted for stage presentation, his *Blue Bird* met with deserved favor when played in the United States. Whether as philosopher, dramatist, poet or essayist, Maeterlinck's subjects concern themselves chiefly with his views of life and death. He is a modern hermit, living with his own dreams. He prefers his bees, of whom he has written so charmingly in *The Life of the Bees,* and his dogs, eulogized in his *Our Friend the Dog,* to the companionship of friends. His wife, Georgette Le Blanc, is a gifted musician.

MAFIA, *mah'fi a,* a secret society in Sicily, more powerful than the Camorra of Naples, which protects its members from punishment for any crime they may commit. There is a higher and a lower Mafia, the latter carrying on the work of blackmail and robberies for the organization, confident that it can rely upon the more influential Mafiosi for protection when involved in difficulty with the authorities. The Mafia controls elections, assists smugglers, directs strikes, and even fixes the hire of workmen. The Italian government's efforts to stamp out the society have not succeeded; however, numbers of its members have been driven from the country, and many of these have organized branches of the Mafia in various cities of the United States, notably in New York and New Orleans, fostering lawlessness and swelling the criminal classes wherever they locate. See CAMORRA.

MAGAZINE, *mag'a zeen,* a military and naval term specifying a protected building or room for the storage of explosives and ammunition. The word is derived from an Arabic word meaning storehouse, and is used as *magasin* in France, meaning a *store* or *shop*. The name is also applied to the chamber of a repeating rifle or machine gun holding a supply of ammunition.

Magazines for explosives and ammunition are generally built underground, or with shell-proof protection. On board ship magazines are placed as far from the engines and fireroom and as far below the water line as possible. They are usually watertight compartments, with walls of steel, lined with asbestos board. In the tropics artificial cooling of the magazine is necessary, and this is accomplished by a ventilating system with pipes to bring cool air from the refrigerator and other pipes for the escape of the hot air. Magazines are also fitted with water pipes by means of which they can be flooded in case of fire. Men working in the magazines wear shoes without nails, and no iron or steel fittings on tools are allowed inside. Ammunition is hoisted through small openings and is taken on small cars to the guns.

Still another use of the word *magazine* is found in its application to a periodical publication bound in book form, usually issued once a month.

MAG'DALEN. See MARY MAGDALEN.

MAGDALEN, *mag'dah len,* **ISLANDS,** a group of islands, politically under the control of the Canadian government, and forming a part of Gaspé County, Quebec. They are situated near the center of the Gulf of Saint Lawrence, fifty-four miles northwest of Cape Breton and about a hundred miles southwest of Newfoundland. The inhabitants, principally French-Canadians, get their living through the fisheries of the adjacent waters, in which lob-

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ster, cod, herring and seal abound. Gypsum is found in large quantities; this and grindstones are the principal exports. Amherst and House Harbor are the leading settlements, the former being a port of entry. Population, about 5,000.

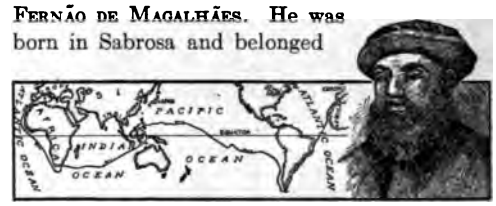
MAGDALENA, *mahg dah la'nâh,* **RIVER,** the most important river of Colombia, South America, the main artery of commerce and communication in the republic. It rises in the Andes Mountains, flows northward and discharges through two channels into the Caribbean Sea. The length is about 1,000 miles, and it is navigable for ocean steamers as far as Barranquilla, where it separates into its two channels. Bogota, the capital of Colombia, depends largely upon this river for communication with points on the coast. Heretofore the city has been reached by steamer from Barranquilla to Girardot, thence by rail, the trip consuming about ten days, but a hydroplane invented in 1916 by Senor Mejfa, that can carry mail and ten passengers, will shorten the trip to twenty-four hours.

MAGDEBURG, *mahg'de boorK,* the capital of the province of Saxony, southwest of Berlin, is a first-class modern fortress, as the term was understood prior to 1914, and one of the leading commercial cities of Northern Germany. The town, built mainly on the left bank of the Elbe, is divided from north to south by a wide avenue lined with historic shops and quaint old gabled houses. There are many beautiful churches, the most famous being the Cathedral of Saints Maurice and Catharine, built mainly between 1208 and 1363, but finished in 1521. It is a fine type of Gothic architecture and contains many monuments and tombs, including those of Otho the Great and his wife Editha. There is also the eleventh century Basilica of Our Lady, the Gothic Church of Saint Ulrich, the modern Church of Saint Paul and the synagogue.

Magdeburg's commercial importance is in its great machine shops. It is also the center of the German beet-sugar industry and well known for its fine fruit and vegetables; there are great distilleries, chemical works, manufactories of chicory, chocolate, tobacco, cigars, cement, fertilizers, pottery, ribbons, gloves and musical instruments.

The history of Magdeburg began in 937, when Otho the Great founded a monastery there, which was later made the seat of an archbishop. During the Middle Ages it was an independent city, and its laws, known as the *Magdeburg Right,* were used as a model by many other towns. It became an important commercial city and one of the most powerful members of the Hanseatic League (which see). In 1524 it adopted the Reformed religion and in the religious wars was conquered by Maurice of Saxony and given to Brandenburg. In the Thirty Years' War it suffered much, belonging first to one side, then to another; finally, by the treaty of Westphalia, it was given to Saxony. Population in 1910, 279,629.

MAGELLAN, *ma jel'an,* FERDINAND (about 1470-1521), the name by which the Portuguese navigator was known who first discovered a route around the world. His real name was FERNÃO DE MAGALHÃES. He was born in Sabrosa and belonged



MAGELLAN AND HIS ROUTE

to the nobility of Portugal, but fell into the king's disfavor and offered his services to Spain. After Columbus returned home with the story of his discoveries, the king of Spain believed that by sailing west India could be reached, and he fitted out an expedition of five ships and 270 men to test his views. Magellan had been to India, directed by Da Gama (see GAMA, VASCO DA), and he boldly struck out for what is now known as South America, the ships leaving Seville on September 20, 1519.

He explored the South American coast, then his frightened men rose in mutiny, and one ship turned back, but Magellan declared he would push on southward "if we have to eat the leather of the rigging." Finally he sailed into a channel between the precipices of Cape Horn and after thirty-eight days a splendid open ocean appeared. He named it the Pacific, which meant *peaceful,* for it was smooth and in contrast to the tempestuous "rounding the Horn." After a tedious voyage the Philippine Islands were reached, and here Magellan was killed by the natives, who were angered by his rough treatment of them. Sebastian Del Cano, as lieutenant, then took command, and he returned around the Cape of Good Hope, reaching Spain on September 8, 1522. The expedition had been gone nearly three years.

Strait of Magellan, the narrow and tortuous strait to which Magellan gave his own name after its discovery in 1520. It is 350 miles long,

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and varies from two to seventy miles in breadth. It separates the continent of South America from the islands of Tierra del Fuego, meaning *fire*, probably so named from the numerous fires of the natives seen from the ships. See HORN [CAPE]; TIERRA DEL FUEGO.

Consult Towle's *Magellan, First around the World;* Ober's *Ferdinand Magellan.*

MAGGIORE, LAKE, or **LAGO MAGGIORE,** *lah'go mahd jo'ray,* is one of the largest lakes in Italy; its name is an Italian word meaning *greater.* It is surrounded on the north and west by granitic mountains rising 7,000 feet above the sea, and on the south and east by picturesque vineyard-covered hills. Although situated for the most part in Northern Italy, part of the lake lies also in the Swiss canton of Ticino. Several interesting towns and villages have sprung up around its shores, the most important being the flourishing city of Pallanza, with a population of about 5,000. Lake Maggiore, which lies 646 miles above sea level, and in some places is over 1,000 feet deep, is thirty-nine miles in length.

MAGI, *ma'ji,* the name applied to the scholarly priests of ancient Media and Persia, who had official charge of all sacred rites and who interpreted dreams and practiced magic. Originally they worshiped Ahriman, the god of evil, as well as Ormazd, the god of good, but devil-worship was forbidden by Zoroaster, the founder of their faith, and the magi became highly-venerated priests of the reformed faith. The three wise men who came from the East to do homage to the newborn Saviour were magi. Their names were Melchior, Balthasar and Gaspar, and it is claimed that their bones are preserved in the Cathedral of Cologne. The youngest of them is represented in works of art as a Moor. The magi, originally of the highest order, gradually lost caste and in time became ordinary jugglers and fortune tellers.

MAGIC, *maj'ik,* a term which refers to the power to command natural and supernatural forces by the priestly adept; it includes also the mystic lore and practice developed to support the view of the operations of nature from which such power is derived. The conception of the world and its regulation in which magic finds its place is that which prevails among primitive peoples. In simpler cultures magic is religion and philosophy, science and art; it brings man into relation with the powers above him; it protects against evil, foresees the future, prescribes for disease and determines the relations of life.

Magic affiliates with the conception of the world and its happenings, as significant for human fate; omens abound in nature and must be sought in signs. Also it affiliates with the view of the animation of sun, moon, stars, sea, river, grove, wind, rain, lightning, by spirit forces; also with the belief in the survival of ancestral ghosts, and thus the creation of an unseen world peopled with spirits that control human fate. Whether strongly spiritual or leaning to the search for power by control over hidden processes of nature, the magical view surrounds life with constant obligations and dangers; and it is in the prescription and proscription, the securing of good fortune and avoidance of evil, that the magician finds his occupation and magic its systematic elaboration. "Magic is the physics of mankind in a state of nature."

The scope of magical belief and practice is so vast that it requires consideration from many aspects. This is given in the articles in these volumes upon *conjuring, divination, superstition* and *witchcraft* (which see). The present article will be confined to a general survey of its development.

The three most general products of magic are divination, the intercourse with spirits and the control of supernatural (or unusual) forces by a penetration of the secrets of nature. Where magic prevails, it shapes belief generally and prescribes what must be done and not done (taboo) to avoid evil and secure good fortune; and it develops special regulations for the cure of disease, the punishment of enemies, the manner of conducting agriculture, the chase, war and the common affairs of life. In early civilizations these beliefs assume a systematic form. They appear prominently in the practices of the Babylonians, Assyrians and Egyptians; and some trace of this Oriental character persists in the Greco-Roman tradition and in the widespread revival of magic in medieval times under the added influence of Christian doctrine. The Egyptians made much of the good and evil days (astrologically determined) for taking medicine, for letting blood, for sacrifice, for sowing and reaping, for undertaking new enterprises. In *Ezekiel* XXI, 21 it is said of the king of Babylon that "he shuffled arrows, he consulted teraphim; he looked in the liver." The control of unusual power by the priest magician appears in the story of Aaron's staff.

It was in the intercourse with the spirit world —which is typically represented (though in a modern form) in the Faust legend—that the most dreaded power of the magician lay. In

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the medieval legend this was the final test of his formulas and incantations, the summoning of the spirits without whose aid he is powerless. Among primitive peoples the belief is a vaguer one in the ability of the enemy by proper ceremonies to bewitch one to death, to spoil crops, to inflict dire disease. This power for evil was known as sorcery (black magic, necromancy); it was prohibited among the Jews (*Leviticus* XX, 27), among the Romans and in English law in the early nineteenth century.

As civilized nations gained a wider acquaintance with the operations of nature, magical practices withdrew to take shelter in special cults, in miscellaneous observances of a folklore type, though never absent from the consciousness of the humbler classes. That the educated classes were exempt from such belief is suggested by Cato's question, whether one diviner could meet another and not laugh; the absurdity of a ragged fortune teller advising others how to gain wealth and accepting a small fee for the advice was as obvious in Roman days as in our own. Magic retains interest for its historical importance as well as for the light which it sheds upon survivals of belief and the origin of customs from which the original meaning has departed or become transformed.

The deposits of magic in the history of thought are many. It appears in the view that learning is a secret and esoteric pursuit, a revelation of mysteries. It surrounds itself with symbols, strange devices, occult operations; it demands years of devoted preparation. Such occupation seems congenial to the Oriental mind; and the prestige of the Orient imparts a similar importance when transferred to the Western world. This factor appears conspicuously in the career of theosophy (which see), a cult that was founded in New York in 1875 and transferred to Madras in 1879; it revived the notion of "mahatmas," or adepts; it performed miracles, such as the transfer of objects through space without contact; and it connected its doings with a mystic view of the nature of being and reincarnation. Though its leader was convicted of gross fraud, the movement continued to thrive. A similar belief in the possession of unusual powers is responsible for the traditions in favor of second sight, for some of the alleged powers of spiritualistic mediums (see SPIRITUALISM), and more remotely for the bias in favor of telepathy (which see). A more practical aspect of the belief appears in the pretension of rain makers and in other wonder-working practices.

Unquestionably the belief in witchcraft in some form is the largest product of magic. Apart from the specific belief in witches (in Christian lands; see WITCHCRAFT), and the general primitive belief in the power of thus inflicting injury by wish and incantation and ceremony (see SUPERSTITION), there is to be included the types of magical cures, treatment by sympathetic magic, the use of fetishes and allied procedures.

Throughout this group runs the magical notion that operation upon something that represents an object will affect the object. The magical idea appears in the Melanesian practice when finding an arrow to place it among cool, moist leaves if it is an arrow that has wounded a friend, but in the hot embers if it is an arrow that has wounded an enemy; in the former case the wound will heal; in the latter case it will be inflamed. Driving nails in a man's footprint will make him go lame, and even the utterance of names will serve (such is the origin of the curse) to carry the disaster to the owner. The converse process underlies cures, the process of which may vary from the treatment of the weapon that made the wound to the exorcism of spirits that caused disease. The fetish is an object to which special significance is attached and which serves to protect from such magical injury as well as to cure by its peculiar power. Material aids may be used, such as the medieval love philters which would compel attraction, while the special pursuits of alchemy and customs associated with it form systematic examples of magical procedure.

Magic when viewed in its relation to religion reflects the conception of the spirit forces from which the power was derived, and from this aspect develops its relation to ghosts, its notions of bewitchment, exorcism and certain phases of divination. In its relation to science it develops the more complex systems of divination by the penetration of the secrets of signs of things; it develops practices of cure and control through insight into hidden forces and an influence upon their operation. In this pursuit appear the use of symbol and correspondence, of the relations of one world (the celestial) with another (the terrestrial) and a third (the spiritual), which constitutes the course of its inquiry. Its aim tends to ambitious and comprehensive projects like the "philosopher's stone." While in our own day the objective view of natural phenomena prevails, tendencies to belief in supernatural powers persist, though

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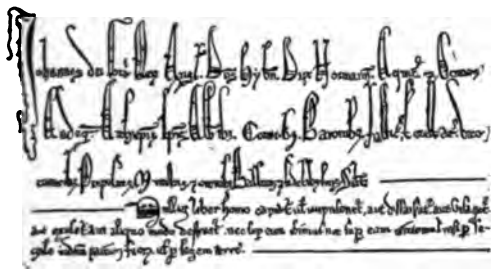
in more enlightened form, while cruder tendencies of the same nature appear in current superstitions and the stray adherence to practices of primitive magic (Voodoo) among the negroes, or to outgrown systems of divination (palmistry and the like) which attract attention by inconsistency with the scientific habit of mind that has displaced them. J.J.

Relating to Various Beliefs. The articles on the following topics, while all do not bear on magic, may be of interest:

Alchemy	Palmistry
Astrology	Phrenology
Clairvoyance	Physiognomy
Conjuring	Psychical Research
Demonology	Psycho-Analysis
Divination	Spiritualism
Faith Cure	Suggestion
Hypnotism	Superstition
Medium	Telepathy
Mesmerism	Theosophy
Mind Reading	Trance
Necromancy	Witchcraft
Occult	

MAGIC LANTERN. See STEREOPTICON.

MAGNA CHARTA, *mag'na kahr'ta,* or **GREAT CHARTER,** a document, often called "the corner stone of English liberty," to which the English barons, under the leadership of Archbishop Stephen Langton, forced King John



MAGNA CHARTA
Facsimile of six lines of the historic document.

to affix his royal seal in 1215. Of this memorable document the historian Myers says:

> Considering the far-reaching consequences that resulted from the granting of the *Magna Charta* —the securing of constitutional liberty as an inheritance for the English-speaking race in all parts of the world—it must always be considered the most important concession that a freedom-loving people ever wrung from a tyrannical sovereign.

The utter disregard and tyranny with which John ruled his subjects in time aroused the entire country, and a council was held in 1213 at Saint Albans, near London, composed of representatives from all parts of the kingdom. Plans were made to meet a few weeks later at Saint Paul's, in London, where for the first time in the history of the nation the interests of all classes were protected in a new charter, modeled after an earlier one granted by Henry I.

As a result of this movement a conference with the king was arranged for in the meadow called Runnimede, on the banks of the River Thames. There, on June 15, 1215, John, much against his will, was forced to do as the barons ordered. After he had put his seal to the document he tried to break its rules, but the barons had guarded against such a danger by appointing twenty-five of their number to compel the king to keep his agreement. This appointment was included in the sixty-three articles of the Magna Charta, most of which, owing to changes wrought by time, have lost their original importance. Three of these articles, however, are of enduring value. These provide (1) that justice shall not be sold or denied; (2) that no man shall be deprived of his liberty or property except upon the judgment of his equals or the law of the land; and (3) that no taxes, except the customary feudal dues, can be levied by anyone without the consent of the national council. The second of these provisions is the basis of the writ of habeas corpus.

The Magna Charta was confirmed thirty-seven times by later kings. Copies of the charter, now a shriveled parchment in the British Museum, were made and distributed about England. M.R.T.

Consult McKechnie's *Magna Carta: A Commentary on the Great Charter of King John;* Barrington's *Magna Charta and Other Great Charters of England.*

Related Subjects. The reader is referred to the following articles in these volumes:

England, subtitle *History*	John (England)
Habeas Corpus	Runnimede

MAGNESIA, *mag ne'zhe ah,* a white, tasteless, earthy substance, used to some extent in families as a mild remedy for an excess of acid in the stomach and as a mild cathartic. In commerce it is employed in obtaining metals from their ores and in making crucibles. It is a compound of magnesium and oxygen. Mixed with water to the thickness of cream it is often sold as *milk of magnesia.* It is manufactured in large quantities from magnesium chloride.

MAGNESIAN LIMESTONE. See DOLOMITE.

MAGNESIUM, *mag ne'zhe um,* a very light, grayish-white metal, which burns with a brilliant white light. It can be drawn into wire and rolled into ribbon. Powdered magnesium

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when blown through an alcohol or gas flame makes a brilliant white light. Mixed with potassium chlorate, magnesium powder is often used for a flash light in photography. The pure metal is of but little value except for its brilliant light, and probably not over twenty tons of it are manufactured annually. A small quantity is used in making alloys, of which *magnalium* (ninety-eight per cent aluminum) is the most useful. Among the important compounds of magnesium are the oxide, *magnesia,* or *calcined magnesia (magnesia usta),* a very infusible, or "refractory," substance used in lining electric furnaces; the carbonate, which occurs naturally as *magnesite;* the basic carbonate, *magnesia alba,* used in tooth powders and silver polishes and in medicine; and the sulphate, Epsom salts (which see). The *chloride* is used for obtaining the pure metal, which is separated from it by electricity.

Magnesium is widely distributed, occurring in asbestos, carnallite, dolomite, hornblende, magnesite, serpentine, soapstone, tourmaline, meerschaum and a few other minerals. J.F.S.

MAGNET AND MAGNETISM. Magnetism is the power possessed by a certain variety of iron ore and by artificial magnets which enables them to attract iron and steel.

Magnets. Many boys have among their possessions small u-shaped magnets like the one shown in Fig. 1, and with this magnet many interesting experiments may be performed. If the magnet is large it may lift a hammer, a

FIG. 1

wrench or other objects of equal weight. A small magnet will lift nails, tacks and iron filings.

With a bar magnet, which is a straight piece of magnetized steel, other interesting experiments may be tried. Place a piece of glass or paper over this magnet and sift iron filings on it, then tap the glass or paper lightly. The filings will arrange themselves in curves around each end of the magnet (Fig. 2). This is one way of showing that the magnetic force is strongest at the ends of the magnet and that it decreases towards the middle of the bar, where it seems to disappear. This is also true of the u-shaped magnet, which is a bar magnet bent into the shape of a *u,* or horseshoe.

The ends of a magnet are called the *poles.* When a bar magnet is suspended in a horizontal position so that it can move freely it comes to rest pointing nearly north and south, and the same end always points north. The magnetic needle is a small bar magnet so mounted that it is free to move on a pivot, and it points practically north and south.

The end of the magnet which points north is called the *north pole,* and is marked by *N* or +. The end pointing south is called the *south pole,* and is marked *S* or —. If we bring the north pole of a magnet near the north pole of a magnetic needle, the north end of the needle turns away from the magnet, but if we present the south pole of the magnet, the north pole of the needle turns towards it. From this and a number of other experiments the law of the poles was discovered. It is this: *Like poles repel, and unlike poles attract, each other.*

How to Make a Magnet. When a piece of iron or steel is brought in contact with a magnet it becomes *magnetized.* Stick a nail endwise on your magnet. You can stick a smaller nail to the other end of the first and a tack to the further end of the second, and the tack will pick up iron filings. Take the first nail from the magnet and the others drop from it and from each other. However,

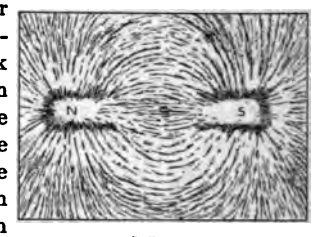

FIG. 2

were a piece of hard steel used instead of the nail it would have retained its magnetism for some time after the magnet was removed. On the other hand, it would have been magnetized much more slowly than the nail. We have learned by repeated experiments that hard steel magnetizes slowly but retains its magnetism a long time, and that soft iron is magnetized quickly but loses its magnetism instantly when contact with the magnet is broken. Rub your knife blade over a magnet from the middle towards the end, carrying it back through the air, and in a short time it will become magnetized. You may also magnetize it by letting it lie on the magnet for several hours. A knife thus treated will pick up needles, tacks and sometimes small nails. Any piece of steel can be magnetized in the same way. One peculiarity of a magnet is that it never loses any of its power through magnetizing other objects. A current of electricity passing through an insulated wire wound about a piece of soft iron will magnetize the iron. See ELECTROMAGNET.

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Magnetic Induction. If the nail above referred to is held within a small fraction of an inch of the magnet it will become magnetized, though not as strongly as by actual contact. Large bodies of iron affect the working of a magnetic needle, even when some distance from it; every compass on a ship has to be adjusted so as to counteract the influence of the iron and steel in the ship's framework. This influence is called *magnetic induction,* and the space within which a magnet influences another body is known as the *magnetic field.*

The Earth a Magnet. Many experiments have been made to test the magnetism of the earth. Scientists discovered many centuries ago that the magnetic needle points nearly north and south because the earth is a great magnet, with poles like other magnets. These are called *magnetic poles,* but they are not located at the geographic poles, the north magnetic pole being in Boothia Peninsula, north of Hudson Bay, and the south magnetic pole lying almost directly south of Sydney, Australia, and about 1,800 miles from the South Pole.

Because of the location of the magnetic poles the magnetic needle points directly north and south in only a few places, and the difference between its direction and due north is known as *magnetic declination* or *variation.* A line that passes through places where the needle points due north is called a *line of no variation.* One of these lines passes through the United States, entering the country on the Atlantic coast about fifty miles south of Charleston, S. C., and passing northward through South Carolina, North Carolina, Tennessee, Kentucky, Ohio and Michigan and crossing the east end of Lake Superior. According to the law of poles the so-called north pole of a magnet is the north-seeking pole, or in reality the south pole, and the so-called south pole is the south-seeking pole.

History. Magnetism was discovered many centuries ago in a variety of iron ore found near Magnesia, Asia Minor, hence its name. Pieces of this ore were found to attract iron, and the name *lodestone* was applied to them. A lodestone is a natural magnet, and is something of a curiosity because lodestones are seldom found. Magnetic iron ore in which the lodestone is found is widely distributed over the earth, but its magnetic power is very seldom strong enough to be detected. C.R.M.

Consult Jeans' *Mathematical Theory of Electricity and Magnetism;* Jansky's *Elementary Magnetism and Electricity.*

Related Subjects. The reader is referred in this connection to the following articles in these volumes:

Compass	Magnetite
Electromagnet	Magneto-Electric Machine
Electromagnetism	
Magnetic Needle	

MAGNET'IC NEEDLE, a thin, slender bar magnet suspended by a thread or mounted on a hard, almost frictionless needle-point, so adjusted that it is free to swing in any direction in which it is influenced. When no magnetic body is near it points approximately north and south, that is, to the north and south magnetic poles. See COMPASS; MAGNET AND MAGNETISM.

MAG'NETITE. Some sand contains small grains of a jet black color, commonly called *black sand.* When a magnet is thrust into the sand, the black grains stick to it and are separated from the sand when the magnet is withdrawn. These black grains are *magnetic iron ore,* or *magnetite.* Magnetite is found in large masses as well as in sand. Such masses occur at the Cornwall mines in Pennsylvania, in the Adirondack Mountains and in Sweden. It always has this black, glossy appearance and is very hard. Magnetite is one of the most valuable ores of iron, for in addition to other ores it greatly improves the quality of the metal produced.

MAG'NETO-ELECTRIC MACHINE, a device in which a magnet is used to generate an electric current. The machine consists of a powerful horseshoe magnet, in front of which a pair of coils, called an *armature,* is caused to rotate (see MAGNET AND MAGNETISM). The armature contains a core of soft iron, which acquires and loses magnetism as it draws near to, and then recedes from, one of the poles of the magnet. These changes of magnetic strength set up alternating currents in the armature. Their force depends upon the strength of the magnet and the speed with which they are rotated. In 1866 an inventor discovered that if the current be passed through the coil of an electromagnet, the force it produces is far greater than when the permanent magnet is employed. By causing a still larger armature to rotate in front of the electromagnet, the inventor was able to increase the force of the current still further. The industrial importance of this discovery was very great, for it led to the construction of powerful machines in which the fixed magnets were electromagnets. Such machines are called *dynamos.* Driven by steam, they generate the electric currents that light the streets of cities and furnish power for

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street cars, elevators and the like. See DYNAMO; ELECTRICITY.

MAGNIFICAT, *mag nif'i kat,* the title given to the Latin text and translation of the song of the Virgin Mary. It is the opening word in the Latin *Vulgate,* "Magnificat anima mea Dominum" ("My soul doth magnify the Lord"). It is sung in the Roman Catholic Church at vespers, or evensong, and in some churches is sung at other devotions. It is said that this canticle or song has been set to music oftener than any other hymn in the liturgy.

MAG'NITUDE, in astronomy, is a term used to express the relative brightness of a star. The ancients, to whom the telescope was unknown, distinguished stars of six degrees of brightness. The modern astronomer still calculates magnitude on a scale ranging from the sixteen stars of the greatest brightness, called first magnitude, to the faintest stars visible to the naked eye, called sixth magnitude. In this scale the quantity of light given by any star is taken to be 2.512 times brighter than that of a star of the next lowest degree of brightness. Sirius and Arcturus, each of which is described under its title, are examples of first-magnitude stars. See ASTRONOMY; STARS.

MAGNOLIA, *mag no'li a,* the name of a tree, or more truly a shrub, with gloomy, blue-green foliage and fragrant, ivory-colored blossoms, named after Pierre Magnol, a French botanist. In some of the warmer countries in the north of Europe a certain species was sometimes called the *beaver tree,* because the beavers used the roots for food and made their houses from the soft wood of the trunk. The magnolia is known by various other names, among them, *sweet-bay, swamp sassafras* and *white laurel.* This shrub, which often grows as tall as a tree, is found in swampy woods in the Atlantic and Gulf States in America, and in parts of Europe, Greenland, Australia, Japan and Java. Because of its beauty the year round it is frequently transplanted to parks and gardens. The leaves are evergreen and the fruit is spike shaped and contains many seed vessels, from which scarlet or brown seeds hang by slender threads. As the flowers grow older they turn from deep cream to a rich peach color. The bark and dried flower buds of the plant are used medicinally. The magnolia is the state flower of Mississippi, Louisiana and Georgia.

Fragrant o'er all the western groves,
The tall magnolia towers unshaded.
—MARIA BROOKS.

MA'GOG, a town in Stanstead County, Quebec, in the southeast corner of the province. It is situated at the north end of Lake Memphremagog, which is navigated by steamers plying between towns in Quebec and Vermont. Magog is also on the Halifax-Montreal short line of the Canadian Pacific Railway, being seventeen miles west of Sherbrooke and eighty-eight miles east of Montreal. The town is a popular resort for anglers, and is also known for its butter and cheese, its textiles, and its lumber products. Population in 1911, 3,978.

MAG'PIE, a bird of pleasing appearance, somewhat similar to the crow and the jay, found in Western North America, from Mexico to Alaska. It is a glossy black in color, with under parts and wing coverts of pure white, and it has a very long, graduated tail. Magpies are usually seen in groups, and are noisy and quarrelsome, delighting in thieving and mimicry. When tamed, they may be taught to speak simple syllables. They build a bulky, domed nest with an opening in the side, usually placed in the fork of a low tree. The eggs are from four to eight in number, grayish white in color, spotted with brown and drab. Species of the magpie are also found in Europe and Asia, where by superstitious people the continued presence of one near the home is considered an ill omen.

THE MAGPIE

MAGYARS, *mod'yahrs,* the name which the upper classes in Hungary prefer to their more familiar one, Hungarians. A little more than 1,000 years ago hordes of Magyars, reckless and skilled barbarian horsemen, plunged into Europe from their home somewhere east of the

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Carpathian Mountains. These wild pagan people spread terror throughout Europe, destroyed the state of Moravia (which see) and harassed Germany and Italy until they were eventually forced back into the country now known as Hungary. There, in spite of many lapses into barbarity and internal strife, they adopted Christianity and practically all the important institutions of civilization. They are imperious and proud and impatient of restraint. In dress they love the most vivid colors and striking combinations. They number over 8,000,000.

The Magyars were for years a dependent people of the old Austrian Empire, a condition which they bitterly resented. Finally their demand for self-government became too strong to be disregarded, and in 1867 Hungary was made a constitutional kingdom in the dual Austro-Hungarian Monarchy (see AUSTRIA-HUNGARY, subhead *History*). Though relations between Austria and Hungary have not been kept on a very friendly basis, the Magyars gave their loyal support to the central empires in the War of the Nations.

MAHABHARATA, *ma hah bah'ra ta,* meaning literally "the great history of the descendants of Bharata," is the name of one of the two great epic poems of ancient India, the other being the *Ramáyana* (which see). The complete work consists of 110,000 couplets, its contents being nearly eight times the bulk of the *Iliad* and *Odyssey* combined. It is divided into eighteen books and primarily narrates the history of the war between the Kauravas and the Pandavas for the possession of the ancient kingdom of Bharata. The matter incidentally linked with the main thread of the story relates to the mythological history as well as the laws, religion, morals and philosophy of India. Through the incidental matter the *Mahabharata* became a veritable encyclopedia of India. The authorship of the epic is attributed to Vyasa "the stranger," but this simply means that the contents were welded together with a certain order and sequence so as to form one work. That this poem was not the work of one man but a production of successive ages is evidenced by the diversity of material and the differences in style.

MAHAN, *ma hahn',* ALFRED THAYER (1840-1914), an American naval officer and author, considered one of the greatest authorities in the world on the sea-power of the nations, was born in West Point, N. Y. His father was a professor in the United States Military Academy, and an author of notable books on military engineering. The son Alfred was educated in the Naval Academy, graduating in 1859, and entering the navy as a midshipman.

In 1861 he was promoted to be lieutenant, and during the War of Secession served in the South Atlantic and Gulf squadrons. Mahan was on duty at the Naval Academy during the years of 1862-1863, and attained the rank of lieutenant-commander in 1865, receiving his commission as commander in 1872, and that of captain in 1885. He was twice elected to the presidency of the Naval War College at Newport (in 1886 and in 1892). In 1896 he asked permission to retire from active service; but on the outbreak of the Spanish-American War accepted office on the naval board, and later was one of the delegates of the United States in the Peace Conference at The Hague.

In 1894 Mahan received from Oxford the degree of D. C. L., and from Cambridge that of LL. D. He also was honored with the latter degree by Harvard, Yale, McGill University (Montreal), and by Columbia University (New York). He is the author of many valuable books, his greatest, *The Influence of Sea Power on History, 1660-1783,* being considered one of the world's most important contributions to naval literature, and reputed to have been the inspiration of Emperor William of Germany in the construction of that country's formidable navy. His *Life of Nelson* is held by many to be the best ever published. Other works are *Life of Farragut, Lessons of the War with Spain, Armaments and Arbitration, War in South Africa* and *Problems of Asia.*

MAHANOY, *mah ha noi',* **CITY,** PA., is a borough in Schuylkill County, in the anthracite coal fields of the east-central part of the state. It is on Mahanoy Creek and on the Philadelphia & Reading and the Lehigh Valley railroads, fifty-five miles northeast of Harrisburg and fifty-one miles northwest of Reading. The population is fifty per cent American and fifty per cent foreign, including English and Welsh, Irish, Polish and Austrians. The population in 1910 was 15,936; in 1916 it was 17,463 (Federal estimate).

Coal mining and shipping are the important industries. Ten coal mines in the vicinity employ 8,000 men. There are also potteries, shirt factories and lumber, flour and hosiery mills.

The city was named in honor of an Indian tribe; it was settled in 1859 and chartered as a borough in 1863.

MAHDI, *mah'de,* an Arabian word meaning *the guided one,* is in the Mohammedan religion

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the name given to the expected Messiah, or messenger of Allah (God), who is depended upon to complete the prophet's work by destroying unbelievers and dividing this world's goods equally among the faithful. According to tradition, Mohammed foretold the coming of the Mahdi, although this is not mentioned in the *Koran.* Many so-called Mahdis have appeared from time to time in Persia, Turkey, Syria and Egypt. The story of one of these is told in Thomas Moore's *Lalla Rookh.* The latest and best-known Mahdi was Mar Mullah, who led an insurrection in the Egyptian Sudan in 1883. After winning several victories from the English, he occupied Khartum, in the defense of which General Gordon was killed. Although the Mahdi died of smallpox in 1885, it was thirteen years before the British recovered possession of Khartum. See GORDON, CHARLES GEORGE.

MAHMUD II, *mah mood'* (1785-1839), a progressive and broad-minded Turkish sultan, to whose radical reforms, both in the government and army, the present Turkish Empire practically owes what modern elements it possesses. Following the deposition of his brother, Mustapha IV, in 1808, he was raised to the throne and immediately began to reorganize the army. A conflict with Russia, which completely prostrated Turkey, hindered his reform plans for several years, but after the peace of 1812 he entered earnestly into the work. In 1826 Mahmud succeeded in destroying the Janizaries, a Turkish army corps which had strongly opposed the military reform, so the army was reorganized on the European model. In 1821 Greece revolted and six years later secured its independence at the Battle of Navarino, although it was not recognized as a separate kingdom by Turkey until 1829, when this recognition was made a part of the Treaty of Adrianople (see GREECE, subtitle *History*).

MAHOGANY, *ma hog'a ni,* a tree of tropical and semitropical regions, producing a heavy wood which is very valuable for cabinetmaking. The timber is light red when felled, but it darkens on exposure to light and air. It is close-grained and difficult to split, polishes readily to a satiny luster, is superior to almost all others in its freedom from shrinking or warping, in holding firmly to glue and in resisting the action of fire. Varieties with irregular grain or wavy figure are most valued for furniture making. The tree is known to botanists as *Swietenia mahagoni* and is found in Mexico, Central America and various West Indian islands.

Little of the true mahogany is now available, that coming from Central America, called Honduras or Panama mahogany, being the wood of species of *Cedrela,* a genus of trees closely related to true mahogany. This wood is softer, lighter and more brittle, but otherwise closely resembles the genuine article. Other substitutes are from African, Australian and Philippine trees, closely allied with the more valuable woods of the American continent. The fineness and beauty of the grain in mahogany are dependent upon the relative rapidity of growth of the tree; the slower the growth, the finer the grain. Trees attain an average height of about sixty feet, with diameters ranging from three to four feet, although heights of one hundred feet have been noted, with diameters as great as six feet.

The mahogany has been an important tree for centuries. The Aztecs crushed the seeds and used the oil for a cosmetic. Its value as timber was first discovered in 1595, when Sir Walter Raleigh's ship returned to England with repairs made from this wood, but it was more than a hundred years later before it came into general use for furniture and cabinetmaking.

Mahogany is one of the most expensive woods used in manufactures; plain mahogany sells for from sixty to one hundred dollars per thousand feet in the log, and unusually fine logs of mahogany have been sold at prices ranging from seven to ten thousand dollars for the entire log. Added to this cost is the cost of transportation and sawing, which often is great. The scarcity of mahogany and the increasing demand for it has led furniture makers to veneer cheaper woods with very thin layers of mahogany. The process is practical and in every way satisfactory, giving the article so treated the appearance of solid mahogany, without decreasing wearing qualities. E.D.F.

MAHOM'ET. See MOHAMMED.

MAHRATTAS, *ma rah'taz,* a vigorous people inhabiting the central part of India south of the Ganges River, representing a mixed Hindu race. They are divided into two great classes: Brahmans, a high type intellectually and physically; and the low-caste people, plain of feature and short of stature, and possessed of remarkable physical endurance. The Mahrattas are devoted adherents of the Hindu religion, Brahmanism, and they speak a language known as *Marathi.* They are supposed to have invaded India about the tenth century, and by the eighteenth century they had established five

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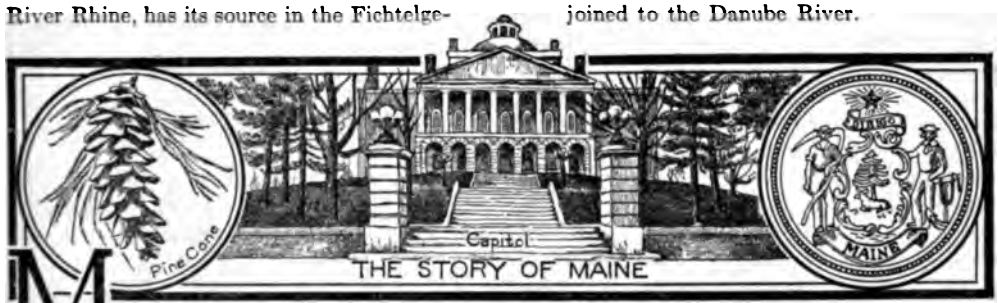
native states. Later their power was broken by the British, to whom they now owe allegiance. They number over 18,000,000.

MAIDENHAIR, *ma'den hair,* a class of ferns whose graceful and delicate fronds make a beautiful covering of green on damp rocks and crumbling walls. The plant is so called from the delicacy of its stalks. It is widely distributed in temperate and tropical regions. From the sweet, fragrant rootstock of the maidenhair of North America is made a syrup called capillaire. Several species are popular ferns in hothouses. See FERNS.

MAIN, the largest eastern tributary of the River Rhine, has its source in the Fichtelgebirge, a mountain range in Northern Bavaria. The stream angles like the letter *S* twice repeated, until it empties into the Rhine near the city of Mainz. It has a total length of 307 miles, and under favorable conditions is navigable to the point where it joins the Regnitz River, 205 miles from its mouth. Its winding course, however, and its numerous shoals, greatly lessen its commercial value, and during dry seasons it is used only by barges, small boats and lumber rafts. Between Mainz and Frankfort it has been converted into a canal on which vessels having a capacity of 1,000 tons may sail. By means of the Ludwig Canal it is joined to the Danube River.



THE STORY OF MAINE

MAINE, *mane,* the most northeasterly state of the American Union, the largest of the New England group. It is popularly known as the PINE TREE STATE, because of the great evergreen forests which cover over three-fourths of its area. As its flower, Maine has appropriately chosen the pine cone. Although it is the youngest of the Atlantic coast states, having been a part of Massachusetts until 1820, within its present limits were one of the earliest colonies and the first incorporated town of America.

Size and Location. Lying adjacent to the Canadian provinces of Quebec on the northwest and New Brunswick on the northeast and east, and having the Atlantic Ocean for its southern boundary, Maine touches only one of the states of the Union—New Hampshire—on the west. The state, over 300 miles long and 185 miles wide, is in shape an irregular quadrilateral. It is nearly as large as the other five New England states combined, and is one and one-half times the size of Nova Scotia. With an area of 33,040 square miles, of which 3,145 square miles are water, Maine ranks thirty-eighth among the states in size, and fifth in extent of water surface.

Its People. The population of Maine is mixed, the foreign-born inhabitants, chiefly French and English Canadians, numbering 110,562, or about one-seventh of the total population of 742,371 (in 1910). Since the admission of Maine as a state, the number of its inhabitants has increased about two and one-half times; from 1900 to 1910 the increase was 6.1 per cent, the population averaging 24.8 per square mile. January 1, 1917, the number of inhabitants was estimated at 774,914. This increase has been due largely to the immigration of aliens. In 1915, 4401 immigrants from Europe reported Maine as their destination.

The early settlers of Maine were of good English stock, and their descendants and those of colonists of neighboring New England states form the larger part of the present population. In the northern section of the state there is a strong French element, chiefly of Acadian stock. A colony of Swedes settled in the northeast in 1870, and a large settlement of Germans was made at Waldboro during the early colonization of Maine. Several hundred Indians, remnants of the Penobscot, Wawenock and Passamaquoddy tribes, the original inhabitants of Maine, still make their home in the state. They are civilized, are occupied in farming and in making Indian souvenirs, and are also employed as guides to hunters and tourists. The number of rural and urban inhabitants is about equal, there being about fifty-six per cent of the population living in towns. Portland,

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with a population of 62,161, is the largest city and principal seaport; Lewiston, Bangor, Biddeford, Auburn, Bath, Augusta, the capital, Waterville and Sanford are other important towns. Each is described in these volumes.

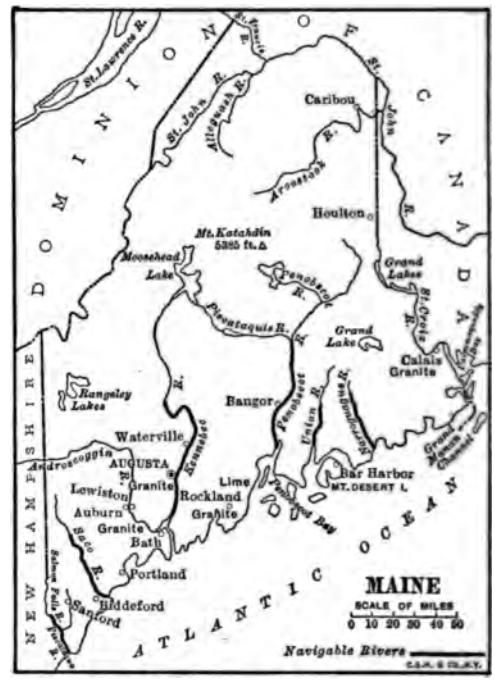
Largely owing to the proximity of the old French provinces of Canada, the number of Roman Catholics in Maine is greater than the total number of Protestants; among the latter the Baptists are most numerous. The Congregationalists, Methodists and Episcopalians are other prominent denominations.

Education. There have been many changes in the school system of Maine. In 1800, while still a part of Massachusetts, the district system was established. The first school law of the state was passed in 1821, and in 1846 a state board of education was created. This board was superseded in 1852 by county commissioners of education, appointed by the governor, and two years later the system was again changed and a state superintendent was appointed. County supervisors were again tried in 1869, but since 1872 the town system of common schools has been in effect, the town superintendent and board of education being under the direction of the state superintendent, who is appointed by the governor. Education, free to all from five to twenty-one years of age, in 1901 was made compulsory.

Normal schools have been established at Farmington, Castine, Gorham, Presque Isle and Fort Kent. The Madwaska Training School is located at Fort Kent. The University of Maine, near Orono, was founded in 1868 as the State College of Agriculture and Mechanical Arts, but in 1897 was given its present name (see MAINE, UNIVERSITY OF). Bowdoin College, at Brunswick, established in 1794, famous as the *alma mater* of Longfellow and Hawthorne and others of New England's great men; Bates College at Lewiston and Colby College at Waterville are prominent institutions of higher education.

Although educational advantages have long existed in Maine the illiteracy is 4.1 per cent, owing largely to the sparsely-settled French portion of the state. The illiteracy among native whites in Maine in 1910 was only 2.4 per cent.

The Land. The rolling state of Maine, with its hundreds of forest-bordered lakes, its turbulent rivers and its sea coast fringed with deep fiords and harbors, and bordered with hundreds of islands, is one of the most beautiful sections of Eastern America. The interior is generally hilly. A continuation of the Appalachians, in the form of a plateau, entering the state on the west at an elevation of 2,000 feet, crosses Maine in a northeasterly direction, gradually dropping to an elevation of 600 feet at its eastern end. A range of hills rises northward from the coast, and another extends from east to west toward the interior. The land slopes in



OUTLINE MAP OF MAINE
Showing the boundaries, navigable rivers, principal cities, mineral deposits, largest lakes and the highest point of land in the state.

the north to the Saint John River and in the south to the coast. The mountains of Maine are not high, and consist largely of isolated peaks. Mount Katahdin, in the central part of the state, the heart of the Moose country, has an elevation of 5,385 feet; Mount Abraham in the west, Mount Kineo, rising abruptly above Moosehead Lake; Mount Bigelow and Mount Blue, are other high peaks whose wooded regions and swift streams are famous hunting and fishing grounds.

Lakes and Rivers. There are more than 1,600 lakes in Maine; these are rock basins scoured out by the glaciers that once covered the state (see GLACIAL PERIOD). Most of these lakes are in the elevated plateau region. Moosehead Lake, the largest, has an area of 120 square miles and is the greatest inland body of water in New England. Rangeley Lakes, ninety

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e miles in area, the source of the Andros-
n River; Chamberlin Lake, from which
the Saint John, and Chesuncook Lake,
water head of the Penobscot, are among
argest.

e rivers of Maine are swift, and most of
flow to the sea in a series of rapids and
des, which have developed the water power
has built up the manufacturing interests
e state. The largest of the rivers are the
nebec, rising in Moosehead Lake, the Pe-
cot, draining one-third of the whole state,

LAKES AND RIVERS OF MAINE
t all the lakes are shown on the map; there
nore than an equal number of smaller bodies
ater.

Androscoggin, the Saco, the Saint Croix
he eastern boundary and the Saint John
he north. The rivers flow through broad
ys and drain numerous lakes which form
reservoirs, making the water supply uni-
throughout the year.

e Coast. Most remarkable of all the sur-
features of Maine is the indented coast,
d and torn by the sea and by glacial
n into a ragged fringe of promontories, and
y deep fiords and harbors rivaling those
orway and Alaska. When measured in a
ght line, the coast of Maine extends 225
, but the actual shore line around the bays
romontories of "hundred-harbored Maine"
26

covers over 2,500 miles. West of the Kennebec, for several miles inland, the coast is flat and marshy, but at Mount Agamenticus, Camden Hills and Mount Desert it rises to bold cliffs.

Maine's excellent harbors are protected from winds by a chain of more than three hundred islands, some low and wooded, others bold and rocky, but they suffer from the great tides which increase northward from Portland, where the rise is eleven feet. Between Eastport and Portland there are proportionally the greatest number of good harbors found anywhere along the United States coast. Some's Sound is the largest and is one of the most advantageous positions on the Atlantic coast for a United States naval station. Other fine harbors are Casco, Penobscot, Frenchman's, Machias and Passamaquoddy bays.

Climate. Because of the arctic currents whose southern reaches touch the shores of Maine, its climate is colder than that of many other places of the same latitude. The winters are severe, the average winter temperature at Eastport and Augusta being 20° F., while at Mount Katahdin the temperature drops to 30° below zero.

The summers are always cool, the average temperature in July being 65° to 70° F., and sudden changes, due to the alternate land and sea winds, occur frequently. The growing season in the southern part of the state is less than six months, and that of the northern section is a month shorter. The rainfall is distributed evenly throughout the year, the average being forty inches; the snowfall on the coast is over sixty inches and in the north 110 inches.

The climate is very healthful, and though damp, is free from malaria. The cool summers, the beautiful seashore, the forests abounding in game and the lakes well stocked with fish have made Maine very popular as a summer resort. Bar Harbor, on the east end of Mount Desert Island; Long Island, Orr's and other islands in Casco Bay, Rangeley and Moosehead lakes and Mount Katahdin are among the most famous summer resorts of the continent.

Agriculture. In the greater part of the state, the sandy soil strewn with gravel and other glacial deposits is unsuitable for agriculture. Aroostook County, in the northern part of the state, the largest district of fertile farm land in New England, is a notable exception. Its potato crop of 17,500,000 bushels reported in the Census of 1910 was three times that of its

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nearest competitor, Weld County, Colorado, and exceeded the crop of all but six entire states. Aroostook County furnishes over half the potatoes of Maine, which is always one of the leading states in the production of this vegetable, yet Penobscot County, with a yield of 3,000,000 bushels, was found by the Census to be fifth among all the counties of the Union.

Fertile sections border the rivers, and although the cultivated farm land has decreased since 1880, there are nearly two and a half million acres of improved land in the state. The chief crop is hay, of which over 1,000,000 tons are produced annually. Potatoes constitute the only other field crop of importance. Apples abound throughout the state, and other fruits are grown, though not extensively. In the counties of York, Oxford, Cumberland, Androscoggin, Kennebec and Penobscot there are many dairy farms, and dairying is the most important branch of the stock-raising industry, though many cattle and horses are marketed.

The state is encouraging agriculture, and in 1914, at the cost of $23,000, acquired an experiment station farm in Aroostook County.

Forests. Although Maine is not among the leading states of the Union in the extent of timber land and the value of forest productions, the soil, unsuitable for agriculture, and the even rainfall have made forestry a very important industry, especially in connection with paper making. Forests, chiefly of pine and spruce, cover seventy-nine per cent of the total area of the state. The virgin growth of pine was long ago exhausted, but the land reforests rapidly, and the second growth is now being used. The spruce forests are the most extensive, and at present furnish the largest part of the timber production. The best spruce is found in the Penobscot valley, and large quantities grow in the northern section drained by the Saint John River. A belt of white birch stretches across the state and furnishes an enormous production of spool timber, much of which is shipped to Scotland, the value of the output per year being over $1,000,000. Poplar forests border the Kennebec, cedar grows in the Saint John and Penobscot valleys, and maple is also found in large quantities. The annnal income from forest products in Maine is over $50,000,000.

To avoid the rapid deforestation of the land, Maine makes a yearly appropriation of $73,000 for the maintenance of state forests. This appropriation is surpassed in only five states of the Union. Advice concerning forest management is given by the state, which also, with the coöperation of the Federal government, protects forests against fire. A timber-land tax supports forest fire service in the unorganized townships.

Fisheries. The deep-sea fisheries were the earliest industries of Maine, which now ranks second among the New England states in the value of its fisheries, being exceeded only by Massachusetts. Seventeen thousand, or over three-fourths of the total number of people in New England engaged in fishing, live in Maine, but the value of Maine's fishing products is only about one-seventh of the total output of New England. The clam, lobster and scallop fisheries are most important. In recent years the lobster supply has been protected by the state, and many hatcheries have been established. Salmon are caught in the Penobscot River, and herring, mackerel, cod, halibut, haddock and smelts are taken in the deep sea and prepared for the market.

Minerals. Owing to the fact that much of Maine is formed by worn-down mountains, granite of all varieties is quarried in great, though decreasing, quantities. With an annual product valued at about $2,000,000, the state has usually ranked with Vermont and Massachusetts as a leading source of granite, but in 1914 it was exceeded by California. It supplies more than one-third of the feldspar of the United States, a mineral used in the manufacture of porcelain, enamel tile, glazed earthenware, emery wheels, sandpaper and opalescent glass.

In the output of slate, Maine stands third among the states. Large quantities of lime are made from the streaked limestone found in Maine. Nowhere else in the world are such large and beautiful tourmaline crystals found. Although the state does not produce a great quantity of minerals, because of their high price it is among the leading states in their value. The total income from mineral products is about $4,000,000 a year.

Manufactures. The great natural resources of Maine, in furnishing water power and cheap transportation, have made manufacturing an important industry. During the last half of the nineteenth century there was an increase of 6.2 per cent in the manufactures of the state, and Maine now ranks twenty-sixth among the manufacturing states of the Union. The principal industries are the manufacture of paper and wood pulp, lumber milling, the making of cottons and woolens, the manufacture of boots

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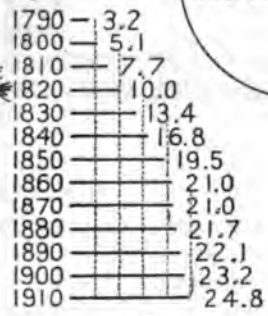
MAINE

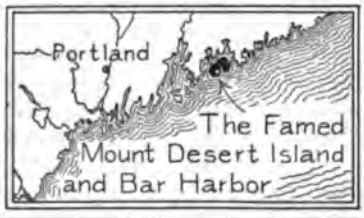
A Rockbound Coast



People per Square Mile by Decades

Center of Population

Lumberman's Cabin



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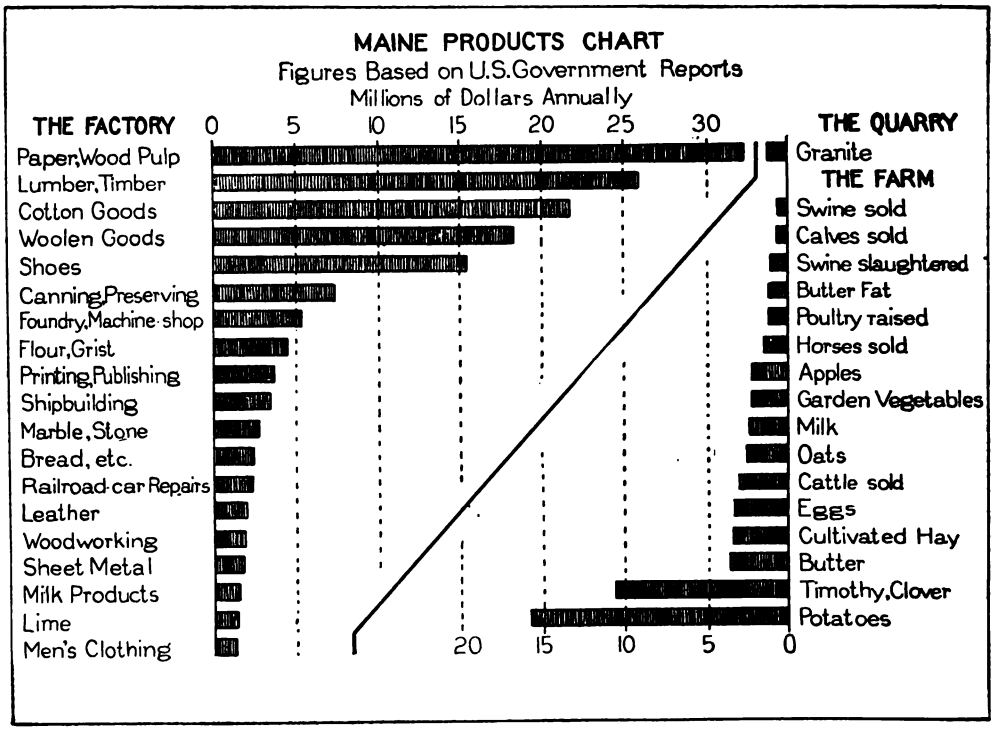

and shoes, the canning of fish and the milling of flour and grist. Lewiston, Auburn, Augusta, Bangor, Portland and Waterville are the chief manufacturing cities, and Bath is a great shipbuilding center. Although the shipbuilding industry of Maine, begun in 1607 when the Popham colonists constructed one of the first American ships, has declined, it is still important. Construction of steel ships has not entirely superseded the work of ship carpenters.

Transportation. The swift rivers of Maine are not navigable for any great distance; in the main they furnish transportation only for the logs from the lumber camps of the interior, but the state is traversed by many railroad lines. In 1914 there were 2,290 miles of railway in the state, the principal lines being the Maine Central, which is in every county but one; the Boston & Maine; the Bangor & Aroostook; the Sandy River & Rangeley Lake; the Grand Trunk and the Canadian Pacific railways. In 1914 the Portland Interurban, extending twenty-nine miles from Lewiston to Portland, was constructed. There are now over 490 miles of electric railway in the state. Anti-pass laws are enforced, and in 1913 a public service commission, consisting of three members appointed by the governor, was created to regulate railroad, street railway, express, gas, electric power, telephone and water companies, and prices.

Government. Maine has had but one state constitution, which was adopted at a town meeting in December, 1819, just prior to its admission into the Union as a state. Amendments to this constitution may be made by a two-thirds vote of both houses and a majority vote of the people at a general election. In 1914 fourteen amendments had been made. All male citizens who can read the constitution and write their names, and who have lived in the state at least three months, may vote. Paupers and untaxed Indians have no franchise. The Australian ballot has been used since 1891.

The legislative department consists of a senate of thirty-one members and a house of representatives of 151 members, all of whom are elected at the same time for two years. The legislature meets the first Wednesday in January. By a two-thirds vote it may overcome the veto of the governor. Revenue bills originate in the house of representatives, which also has the power of impeachment. Maine sends four members to the United States House of Representatives.

The executive power is vested in a governor, elected for a two-year term by popular vote, and an advisory council of seven, appointed by

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RESEARCH QUESTIONS ON MAINE

(An Outline suitable for Maine will be found with the article "State.")

What college of Maine had as its graduates two of the most famous writers the United States has ever produced?

What county raises the most potatoes of any in the country? Which county is second? About how much difference is there between them?

How many states manufacture more products than Maine? What was the first important industry of the territory? Is it still of any importance?

Of what state did this region once form a part?

What was the "Ohio fever," and how did it affect this territory?

When did Maine pass its first school law? How long has education been compulsory?

Why is the climate somewhat colder than that of various other places in the same latitude? What advantage does this bring?

What important product of this state is widely used in making roofs? What is the most beautiful product of its mines?

What was the first name given to the region? With what is that name associated in your thoughts?

What distinction has the strip of coast between Eastport and Portland?

What part did the Glacial Period have in determining the chief products and industries of this state?

Who were probably the first white men to visit the Maine coast? Through whom did knowledge of the region first reach Europe?

About how many Indians remain in the state? How do they differ from the Indians of Iowa?

In what way does the coast of Maine resemble that of Norway? Did the same agency determine both?

How many of the New England states surpass Maine in value of fishery products? How many in the number of people engaged in fishing?

What laws have been passed since 1908 which show the progressive character of the state?

About how many more inhabitants has Maine than it had when it became a state?

What is the largest inland body of water in New England?

What have the rivers of Maine had to do with its industrial development?

What steps has the state taken to prevent the total destruction of its forests?

How long has this state had a prohibition law?

Upon how many states of the Union does Maine border? Is the same thing true of any other state?

How many times as high as the loftiest point in Maine is the tallest peak of Montana? Of Arizona?

What important part might some product of Maine have taken in making the material of which this book is composed?

How many constitutions has this state had?

What do the popular name and the state flower indicate as to Maine's plant growth?

What is almost the only product which is carried on the rivers of Maine?

How are railway rates regulated?

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the legislature. The governor has power to remit penalties, grant reprieves, pardons and commutations. In case of vacancy in the office the president of the senate and the speaker of the house are next in line for the governorship. The state secretary and treasurer are elected biennially by joint ballot of the legislature.

At the head of the judiciary department is the supreme court, meeting each year at Augusta, Bangor and Portland, and having eight judges appointed for seven years by the governor. There are superior courts, each having one judge, in the counties of Cumberland and Kennebec. These are appointed for a term of seven years. Probate judges are elected by the people of each county for four years. Municipal and police court judges are appointed for four years by the governor and council. The attorney-general is elected for two years on joint ballot of the legislature.

Maine is notable as being one of the leading states in the prohibition movement, having passed a prohibition law in 1846, which was made part of the state constitution in 1884. As early as 1677 and 1690 laws were made in the colony that "henceforth no rum or other strong liquor be sold except in case of necessity." In 1913 a law was passed against public drinking of any intoxicating liquor.

Maine is the only state retaining organized "plantations," which are unorganized townships of at least 200 inhabitants, having charters, officials and school councils, and being free from state taxation except by special legislative order. Other unincorporated districts called grants, surpluses and tracts still exist.

In 1908 the initiative and referendum were adopted by the people (see INITIATIVE AND REFERENDUM). Recent state legislation shows increasing interest in charitable institutions, and in industrial and welfare movements. In 1913 a state board of charities and corrections was created; a law was passed requiring state aided hospitals to receive inmates of state schools without charge; farms for inebriates were established in Cumberland and Penobscot counties. In 1915 laws were passed prohibiting children under fourteen years of age from employment in factories or mercantile establishments, and providing that all children's homes be licensed. An industrial accidents law was passed in 1913 and the next year a workmen's compensation law was enacted (see EMPLOYERS' LIABILITY).

There is a state prison at Thomaston; a reform school for boys at South Portland; an industrial school for girls at Hallowel; a military and naval orphanage at Bath; institutes for the blind and deaf at Portland; insane hospitals at Augusta and Bangor, and a home for the feeble-minded at West Pownal. All of these are maintained by the state. Almshouses and asylums are supported by counties.

History of Maine

Exploration. Probably the first white men to visit Maine were the Norsemen under Thorwald, who are believed to have made a settlement there in the eleventh century. The region remained practically unknown, however, until 1524, when Verrazano discovered the Gulf of Maine, and called the country *New France*. Gosnold, DeMonts, the Cabots and Weymouth explored the coast, and John Smith in 1614 mapped the shore line and gave the territory the name of *New England*.

Settlement. In 1603 Henry IV of France granted a charter to DeMonts for all of the territory between 40° and 46° N. latitude and called it *Acadia*. Upon this charter and the voyage of Verrazano the French based their claim to the region. In 1607 the territory was granted by James I to the Plymouth Company, and a colony under George Popham and Raleigh Gilbert was established at the mouth of the Kennebec.

In 1622 the territory between the Merrimac and Kennebec rivers was given to Mason and Gorges. In 1636 Gorges established a government in the eastern section, which was the first organized government in Maine. The next year a charter naming this land the *Province of Maine,* to distinguish the mainland from the numerous islands off the coast, gave the territory to Gorges, and Georgiana, the first incorporated town of America, was founded here in 1641 on the present site of York.

As a Part of Massachusetts. In 1677 Massachusetts purchased the province, which, after being again made a royal territory by William and Mary, was incorporated with Massachusetts by charter in 1692. Maine gave loyal support to England in the French and Indian wars, to the colonies in the Revolution, and to the states in the War of 1812, during which its manufacturing industries suffered greatly. The population was decreased by the Ohio

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fever, as the impetus towards western migration was called in 1815 and 1816.

Statehood. In 1820 Maine was admitted as an antislave state, offsetting the new slave state, Missouri. The northern part of Maine, which had been ceded to the United States by Great Britain in 1783, at the close of the War of the Revolution, was transferred to the state. The north and northeastern boundaries, however, were long disputed, but were settled by the Webster-Ashburton Treaty in 1842, when Maine definitely assumed its present limits (see WEBSTER-ASHBURTON TREATY).

THE NORTHEAST BOUNDARY

Solid line, United States claim; dotted line, British claim. The northern limits of the area in solid black show the boundary as fixed by the Webster-Ashburton Treaty.

In the War of Secession Maine furnished 75,000 troops to the Union, incurring a debt of $12,000,000 for their equipment, $6,000,000 of which was later refunded by the national government. Maine has never had any serious state troubles. Since 1883 the state has been Republican, although in 1910 and 1914 Democratic governors were elected. R.J.A.

Consult Hale's *The State of Maine;* Holmes' *Makers of Maine;* Burrage's *Beginnings of Colonial Maine.*

Related Subjects. In connection with the study of Maine, the reader is referred to the following articles in these volumes, which contain much added information:

CITIES AND TOWNS

Auburn	Biddeford
Augusta	Lewiston
Bangor	Portland
Bar Harbor	Sanford
Bath	Waterville

LEADING PRODUCTS AND INDUSTRIES

Apple	Hay
Dairying	Paper
Fish	Potato
Forests and Forestry	Tourmaline
Granite	

RIVERS

Kennebec	Saco
Penobscot	Saint John

UNCLASSIFIED

Katahdin	Mount Desert
Moosehead Lake	

MAINE, UNIVERSITY OF, the state university of Maine, was founded at Orono in 1865 under the name State College of Agriculture and Mechanic Arts. It was opened in 1868, and received its present name in 1897. The University of Maine and that of Vermont are strictly the only two state universities in New England. The institution comprises the colleges of arts and sciences, agriculture and technology, and the college of law, at Bangor; the Maine Agricultural Experiment Station is also a university department. Degrees are conferred in arts, philosophy, science, law, agriculture, engineering, forestry, home economics and pharmaceutical chemistry. Both men and women students are admitted, the average enrolment exceeding 1,200. There are about 150 members on the faculty. The library contains about 55,000 volumes, and the college property is valued at over $818,400. R.J.A.

MAINTENON, *maN t' nawN',* FRANÇOISE D'AUBIGNÉ, Marquise de (1635-1719), the second wife of Louis XIV of France. Her father and mother died while she was but a young girl, and she was cared for by her aunts, who had her educated in a convent. When she was sixteen, Scarron, the poet and wit, made her acquaintance, and was impressed with her helpless state no less than with her beauty and cleverness. At length he offered either to marry her or to pay for her admission to a nunnery, and she chose the former alternative. He was deformed, and much older than she, but he entertained in his home the most brilliant intellectual society of the day, to which she was an added attraction.

When Scarron died in 1660 she was again left in poverty, but Madame de Montespan, the king's mistress, procured for her a pension and later the position of governess to the king's children. She soon won the favor of the king, and after the death of the queen he married her, though she was never openly recognized as his wife. Her influence over him was very strong, and always exerted on the side of right, though her political suggestions were not always of the wisest. She had founded, soon after her marriage with the king, a school for young ladies at Saint Cyr, and to this she retired after his death. It was for the pupils of this

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school of Madame de Maintenon's that Racine wrote his *Athalie* and *Esther*.

Consult Blennerhassett's *Louis XIV and Madame de Maintenon*.

MAINZ, *mine'tz,* a famous German fortress of the first rank, the seat of a Roman Catholic bishop and the largest town in the grand duchy of Hesse, is situated on rising ground along the left bank of the River Rhine, twenty miles southwest of Frankfort. It is one of the most ancient of German cities, but its oldest part was modernized after its complete destruction in 1857, caused by a powder-magazine explosion. An entire new quarter has been added since the recent widening of the fortified circuit. Mainz was the birthplace of Gutenberg, who invented the art of printing with movable types, and a fine statue by Thorwaldsen has been erected here in his honor; his house, too, is one of the places visited by the tourist.

The city is an important center of the Rhine trade with Holland and Belgium, and also carries on a large transit trade by railway. Its manufactures include furniture, leather goods, musical instruments, machinery and chemicals, while brewing, printing and market-gardening also represent important activities. Although the history of Mainz is associated with Rome from the year 13 B.C., the real importance of the town dates from the Frankish emperors. It was several times in possession of France, and in 1816 was assigned to the grand duchy of Hesse. After 1866 it was held by Prussian troops, and in 1870 it was declared an imperial fortress. Population, 1912, 118,000.

MAIR, Charles (1838-), a Canadian poet and journalist, best known for his poetic drama *Tecumseh,* which shows a clear insight into Indian character. Mair was born at Lanark, Ont., was educated at the Perth grammar schools and at Queen's University, Kingston. Later he studied medicine, and for a time was engaged in business. At an early age he began to write for the press, both in prose and verse, and his first volume, entitled *Dreamland and Other Poems,* appeared in 1868. In the meantime Mair had become the Fort Garry (Winnipeg) correspondent of a Montreal newspaper. He was in Fort Garry at the time of the Red River Rebellion, and was imprisoned and condemned to death, but managed to escape. During the Saskatchewan Rebellion he served as a medical officer. His most important work, *Tecumseh,* appeared in the following year, 1886. Noteworthy among his other books are *The Fountain of Bemini; The Last Bison; The Conquest of Canada,* and *Through the Mackenzie Basin.* After the Saskatchewan Rebellion Mair made his home in the West, in turn in British Columbia, Saskatchewan, Alberta and then British Columbia again.

MAISONNEUVE, *ma zo nev',* a city in Quebec, on the island of Montreal, about three miles northeast of the city of Montreal. Although legally a separate city, Maisonneuve is really an industrial suburb of Montreal. Running through both of the cities are the Canadian Pacific, the Canadian Northern and the Grand Trunk railways, all linked by terminal electric railways. Maisonneuve has regular steamship connection with various ports on the Atlantic coast, the Saint Lawrence River and the Great Lakes. In 1910 the city ranked sixth among the manufacturing centers of the Dominion, with an output of $20,813,774, a total more than three times as great as the output of 1900. There are about fifty large industrial establishments, employing approximately 20,000 people. Most important among the products are cans, spool cotton, licorice, shoes, shoe machinery, bridges, wall paper and biscuits. Noteworthy buildings are the city hall, public market and gymnasium, the dry dock and the government navy yard. Population in 1901, 3,958; in 1911, 18,684; in 1916, 34,856.

MAISONNEUVE, Paul de Chomedey, Sieur de (? -1676), a French soldier and colonial governor, founder of Montreal and for twenty-two years governor of the colony. He entered the French army at an early age, and served with distinction in many campaigns. About 1640 he became interested in the proposal to found a religious colony in New France and in the next year, under the patronage of a pious French nobleman, sailed from France with a small band of enthusiasts. Before the forty-five emigrants (four were women) set sail, they met in the great cathedral of Notre Dame in Paris and solemnly consecrated the new settlement to God. Maisonneuve and his band reached Quebec in the autumn of 1641 and spent the winter there. The governor of Quebec, fearing that the new settlement might prove a dangerous rival, pointed out the dangers from Indians, but Maisonneuve replied with characteristic fearlessness: "I have not come here to deliberate, but to act. It is my duty and my honor to found a colony at Montreal, and I would go if every tree were an Iroquois." The new settlement was founded on May 18, 1642. "The afternoon waned,"

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says a chronicler, "the sun sank behind the western front and twilight came on. Fireflies were twinkling on the darkened meadow. They pitched their tents, lighted their bivouac fires, stationed their guards, and lay down to rest. Such was the birthday of Montreal." Maisonneuve was governor of the colony for the first twenty-two years of its existence, and during this period all his wisdom and ability were needed to keep the colony from the control of the Sulpicians; but he was finally removed by De Tracy in 1665 because he insisted on maintaining the practical independence of Montreal from Quebec. The last decade of his life he spent in obscurity in France.

MAIZE, *maze,* one name applied to the common corn, or Indian corn. See CORN.

MAJESTY, *maj'es ti,* a term used to express the royal power and dignity of an emperor, king or queen, as the head of a nation. The name is derived from the Latin word *majestas,* meaning *greatness* or *grandeur.* In the Middle Ages the title was conferred upon the successors of the emperors of Rome. The term was subsequently used in connection with kings, and distinctions were made between *imperial* majesty and *royal,* or *kingly,* majesty, which was a step below that of an emperor. The fullest form of the expression is "His Most Gracious Majesty." The reigning king of any country has the title of "His Majesty," it being abbreviated to H. M. The initials H. I. M. refer to "His Imperial Majesty," the title of any reigning emperor.

MAJOLICA, *ma jahl'i ka,* an earthenware of beautiful luster, believed to have been named after the island of Majorca, home of the Moorish potters, from whom the ware had long been imported into Italy. The term *majolica* was first used in the middle of the sixteenth century, when it was applied to many varieties of glazed pottery, and to-day a large class of wares is often called majolica which should be properly termed *faïence.* The earliest date found on an Italian-lustered piece is of the year 1489. The only men acquainted with the use of luster were Pesaro, Gubbio and Deruta, and after a vogue of eighty years it became a lost art, about 1570. The craft has been revived with varying success, but the new enamels cannot compare in beauty with the old models. The finest specimens of majolica were made in Northeastern Italy; vases, pitchers, plates, bottles and odd-shaped flasks were the most commonly-decorated objects, but tiles were sometimes made of majolica for floors and walls.

MA'JOR, the Latin word for *greater,* is a title of a military officer. In the army of the United States a major is a commissioned officer ranking above a captain and below a lieutenant-colonel. He is a battalion commander under the orders of a regimental commander, each regiment of infantry or cavalry having three majors. As insignia of his office the major wears a gold-embroidered leaf at each end of his shoulder straps. An officer who performs for a brigade the duties ordinarily discharged by a major in a battalion is known as a *brigade major,* and the officer ranking next above a brigadier-general bears the title *major-general.* This is the highest permanent grade in the United States army.

In the British and Canadian service *major* is also the title of an officer ranking between a captain and lieutenant-colonel. In the command of a cavalry regiment, infantry battalion or artillery brigade the major is second in authority to the lieutenant-colonel. Majors also command squadrons of cavalry and batteries of artillery. See RANK IN ARMY AND NAVY.

In the United States army the pay of a major is at first $3,000 per year, but it increases $25 per month after each five-year period of service until the maximum pay of $4,000 is reached. In Great Britain the pay is $1,421; in France, $1,063; in Germany, $1,560; in Russia, $398; in Japan, $774.

MAJOR, a musical term, for explanation of which see MUSIC; SCALE.

MAJORCA, *ma jawr'ka,* the largest of the Balearic Islands, a group in the Mediterranean Sea east of Spain, of which they are a possession. The famous majolica pottery takes its name from the supposition that the first specimens of the ware were made on the island of Majorca. The island is 107 miles southeast of the mouth of the Ebro, the nearest point on the Spanish coast, and is 171 miles north of Algiers. It is about sixty-four miles long, forty-eight miles wide, and has an area of about 1,386 English square miles. The northwestern part is mountainous; the southern half of the island is broken up by hills, valleys and fertile plains. The inhabitants resemble the Spaniards in appearance and are industrious agriculturists. The chief products of the island are fruits, wines, marble, cereals, hemp, flax and silk. The capital, Palma, is the principal town. Population, 1910, 264,200.

MAKAW', or **MAKKAH,** the only tribe of North American Indians called *Cape Indians,* although other tribes once lived on promon-

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tories. Their tribal name, Kew-net-che-chat, means *cape people*. The Makaws inhabit the region along Puget Sound and along the Strait of Fuca, on Cape Flattery. They excel in the management of canoes and are bold and daring fishermen, venturing farther from land in search of fish than any of the neighboring tribes. Formerly they were a warlike tribe, but are now fairly civilized and live upon a small reservation on the cape. The women are expert basket weavers. They number less than 400.

MALACCA, or **MALAKKA,** *ma lak'a,* a territory in the British Straits Settlements, on the southwest coast of the Malay Peninsula, the southernmost point in Indo-China and ninety miles above the equator. It has an area of about 700 square miles. Next to India it once had more commerce than any other part of continental Asia. It is low and swampy, and the principal products are rice, pepper and sage. The principal exports are tin and rubber. In 1911 the population was 125,000.

Malacca, the capital of the territory of Malacca, is situated 125 miles northwest of Singapore, a town whose growing trade has decreased the commercial importance of Malacca. It was founded by the Portuguese in the fourteenth century, passed into the hands of the Dutch in 1641, and was taken by England in 1824. Population, 1911, 21,200.

Strait of Malacca, a body of water between the Malay Peninsula and the island of Sumatra, connecting the Bay of Bengal with the South China Sea. Its breadth varies from 50 to 250 miles and it is 500 miles long. The narrower end has a number of small islands; one of these is Singapore, on which is the important trading center of the same name. See SINGAPORE.

MALACHI, *mal'a ky* (420 B.C.), the last of the Hebrew minor prophets, and writer of the book of *Malachi*. The name means *messenger of Jehovah;* it is also translated as *my messenger*. His writings supplement those of Ezra and Nehemiah, and his prophecies show that they were given after the return of the Jews to Jerusalem and the rebuilding of the Temple. Some modern authorities consider the name to be a title and not the real name of the prophet.

Book of Malachi. This is the last book of the Old Testament, and it is divided into three sections. The first represents Jehovah as the loving father and ruler of His people; the second rebukes the priests for their departure from the true worship and reproves the people for mixed marriages; the third foretells and emphasizes the coming of the Messiah.

MALACHITE, *mal'a kite,* a copper ore usually found massive in structure, is a beautiful green in color, and is used for ornaments, mosaics and as a veneer for costly furniture. It is formed in layers varying in shade from apple to verdigris green. Of old, amulets of malachite were thought to be a protection against lightning, witchcraft and contagion. By some authorities the ore is thought to be identical with the Hebrew stone *soham,* one of the sacred jewels of the high priest's breastplate. Ground to a powder, it is used as pigment under the name *mountain green.* The chief sources of the mineral are Siberia, Russia and Australia.

MALAGA, *mah'lah gah,* one of the most important seaports of Spain and capital of a province of the same name, is situated in the extreme south of the country, on the Mediterranean Sea, sixty-five miles northeast of Gibraltar. Because of its mild and uniform climate, Malaga has become famous as a resort for invalids. Though the city's trade has shown a decline in recent years, due to disease-ravaged orange and lemon groves, unscientific methods of agriculture and insufficient means of communication, still olives, olive oil, wine, raisins, lead, almonds, lemons, grapes and esparto grass are exported annually to the amount of $5,000,000. Manufacturing industry has been given renewed impetus, and there are thriving establishments for making cotton and linen goods, artistic pottery, flour, soap and wine and oil presses. Of the 2,500 vessels which enter the harbor annually, one-sixth are British and three-fourths are Spanish.

Under the Romans Malaga was a flourishing town, having been founded by the Phoenicians. It was also an important city under the Moors, and there still remain a Moorish castle, built in the thirteenth century, and similar Moorish landmarks in the older parts of the town which stand out in marked contrast to the imposing modern structures in the newer quarters of the city. Population, 1910, 136,365; the number of people has varied but little since 1880.

MALARIA, *ma la'ri a,* an infectious disease caused by an animal germ that feeds on the blood of man and certain mosquitoes. It is characterized by chills, fever and sweating, and is known also as *ague, marsh fever, chills and fever* and *malarial fever.* The name *malaria* is really a misnomer; it is the Italian word for *bad air,* and was applied to the disease because formerly it was believed to be caused by poisonous emanations from swamps and marshes. This impression prevailed until the latter part

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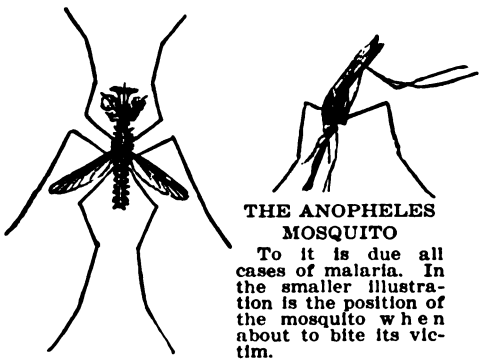
of the nineteenth century, but in 1880 a French surgeon found an animal germ in the blood of his malaria patients, and this discovery led scientists to the conclusion that the disease was caused by some biting insect that lived in swampy districts. Investigations followed, and the insect was found to be the species of mosquito known as the *Anopheles* (see MOSQUITO). The civilized world is now engaged in relentless warfare against this dangerous insect, and



THE ANOPHELES MOSQUITO
To it is due all cases of malaria. In the smaller illustration is the position of the mosquito when about to bite its victim.

wherever it has been exterminated malaria is unknown. Attacks on the mosquito have rendered the fever-infested districts of Cuba and the Canal Zone on the Isthmus of Panama wholly free from the disease (see GORGAS, WILLIAM C.).

Symptoms. A typical attack of malaria progresses through three stages—the cold, the hot and the sweating. The first is preceded by headache and a general feeling of discomfort; gradually a chill comes on, causing the patient to shake violently, while the temperature rises to 102° or more. The shivering stage lasts about ten minutes and is followed by the hot stage, during which the skin becomes flushed. A period of from one-half to three or four hours elapses before the sweating stage begins; then beads of water appear on the forehead and finally the whole body is bathed in perspiration. Then the fever and headache subside and in the course of an hour or two the patient falls asleep and the attack is over for the time being. Paroxysms recur at regular intervals of from one to four days until the poison is eliminated from the system.

Treatment. It has been said that the settlement of much of the American continents would have been impossible without quinine, the only reliable remedy for malaria that is known. Doses of this drug usually cure even a persistent attack. The disease occurs in its most dangerous form in the tropics, where it is often fatal. Repeated attacks cause the sufferer to become seriously anaemic, a condition that needs special treatment by a competent physician. See ANAEMIA. S.C.B.

Consult Ezdorf's *Malarial Fevers;* Herms' *Malaria, Cause and Control.*

MALASPINA, *mah lah spe' nah,* **GLACIER,** the largest glacier in Alaska, in area equal to one-tenth of Switzerland, the country famous for its glaciers. It is more like a lake of ice than a river; it does not flow down a valley but lies in a great table-land, and is formed by the inpouring of several valley glaciers. On the western coast of the territory it overlooks the Pacific for scores of miles, and as its great mass moves slowly but constantly under the pressure of the ice rivers behind it, huge masses break off into icebergs, which render sea travel in near-by waters difficult and dangerous.

Every characteristic feature that other famous glaciers have the Malaspina possesses. There are fathomless crevasses that reach far downward; there are rushing streams in summer, and lakes dammed up by heaps of débris; and there are moraines. Indeed, the moraines along its border constitute one of its strangest features; below, reaching to a depth of a thousand feet or more, there is ice which never melts; above, on the solid matter deposited through the ages, are spreading trees, and, in the summer, blossoming flowers. See GLACIER; MORAINE.

MALAY ARCHIPELAGO, *ma lay' ar ki pel' a go,* the largest group or system of islands in the world, situated between the southeast of Asia and the continent of Australia, the equator running through the middle of the group. The archipelago includes the Moluccas, the Sunda Islands, New Guinea, the Philippine Islands and dependent groups (see map, in article OCEANIA). The islands are all of volcanic formation. It is assumed that Asia and Australia were joined together in prehistoric times, and when separated the land was broken up, leaving only the existing islands above the sea. They possess an intensely fertile soil, with a great wealth of vegetation. Oranges, mangoes, guavas, rice, maize, sugar, coffee, cacao, cocoanut, sago, breadfruit and yams flourish, and gutta-percha, camphor and other forest products are exported. (All of these products are described in their places in these volumes.)

Gold, manganese and platinum are found in many of the islands; copper is exported from the Philippines, and there are extensive tin mines in several islands. In Java have been

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found fossil remains of a prehistoric animal intermediate between man and the apes; the archipelago also abounds in other objects of interest to zoölogists and naturalists. The native inhabitants belong chiefly to the Malay and Papuan races. Politically the greater portion of the archipelago is under the Dutch government. See EAST INDIES, DUTCH.

MALAY PENINSULA, the southernmost tip of Asia, a drumstick-shaped strip of land extending from Burma and Siam to the East Indian islands (see color map, ASIA, for location). It is about nine hundred miles long. Its upper third, though less than two hundred miles wide, is divided longitudinally between Burma on the west and Siam on the east; its center third is a part of Siam and its southern third includes the Federated Malay States (which see), with a handful of other tiny native states protected by Great Britain, and the Straits Settlements. The lower half of the peninsula is paralleled by the Dutch island of Sumatra, from which it is separated by the Malacca Strait. Through this strait, which from a width of three hundred miles narrows down to less than twenty-five at its southeastern end, passes nearly all the rich traffic from the Suez Canal or India to Siam, Indo-China, China, Japan and the Philippines, and much of that to the East Indies and Australia.

The Malay Peninsula approaches nearly to within a degree of the equator, and is a distinctly tropical land. Though traversed by mountain ranges, some of which rise to a height of over 7,000 feet, it has an unbroken covering of the densest of equatorial jungles, scarcely any of which have as yet been penetrated by man. There are, however, hundreds of rivers, along the banks of which dwell the two million or more natives. Though once considered an impossible region for the white man, the peninsula now has a good reputation for health. Nevertheless the population is almost entirely composed of natives, Chinese and British Indians. The natives include Siamese, Malays, a third race which resembles the Indo-Chinese, and a fourth, negritos. The most famous product of the peninsula is tin, which is found in alluvial deposits; no other country produces as much. Other exports—among them rice, tapioca, copra (dried cocoanut), sugar and pepper—are typical of the tropics. Rubber plantations are increasing in number. See FEDERATED MALAY STATES.

Consult Fraser's *Quaint Subjects of the King;* Wilkinson's *Malay Beliefs.*

MALAY RACE. See RACES OF MEN.

MALDEN, *mawl'den,* MASS., a city which includes several villages in Middlesex County, five miles north of Boston, of which it is a residential suburb and postal substation. It is on the Malden River and is served by two divisions of the Boston & Maine and by a number of interurban lines. Freight is largely handled by river boats. The area of the city is nearly five square miles. The population in 1910 was 44,404; in 1916 it was 51,155 (Federal estimate).

Malden has an excellent park system, and northwest of the town is Middlesex Fells, a state reservation. The city has an attractive residence section, and contains a public library, an auditorium, a Y. M. C. A. building, a hospital and a Home for Aged Persons.

In the manufacturing section are rubber boot-and-shoe factories, whose annual output is valued at $6,000,000, and manufactories of glue, cords and tassels, sandpaper, emery paper, boot-and-shoe lasts, fire hose, knit goods and soap.

Malden was first settled about 1640, and was a part of Charlestown until 1649, when it was incorporated as Mauldon. It was chartered as a city under its present name in 1881.

MAL'DIVE ISLANDS, a group of low, coral islands 400 miles southwest of Ceylon, composing a chain in the Indian Ocean. They have an average elevation of from six to twenty feet above sea level. These islets are arranged into twelve groups known as atolls (see ATOLL), and number about 1,000, of which nearly 200 are inhabited. The total land area is about 115 square miles. Though under British protection, they are governed by an elected sultan, who pays a yearly revenue to the British government at Ceylon. Rich vegetation covers the islands, and cocoanut palms yield edible nuts. Breadfruit, citron and fig trees produce abundant fruit, and wild fowl and fish are plentiful. The inhabitants are of mixed Arab and Singhalese extraction, and are of the Mohammedan faith. They are expert sailors and carry on an active trade in their own vessels with Ceylon, Bengal and the Malabar coast, exchanging mats, fruits, nuts and cowrie and tortoise-shells for tobacco, sugar, rice and manufactured goods. The climate is hot and somewhat unhealthful. Population, about 50,000.

MALICE, *mal'is,* in law, is ill will toward another so strong that it prompts an injurious act. A crime committed with the hope of personal gain is not necessarily malicious. Wil-

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fully harming the person or property of another for spite, revenge or for the mere wish to injure is malicious, so also is the intentional neglect of an obligation to others. Where the act is specially deliberated and not the immediate result of a sudden determination, there is said to be *malice aforethought*. *Malicious mischief* is injury done to the property of another without cause, even if committed without knowledge as to the indentity of the owner.

MALINES, *ma leen'*, in German, **MECHLIN,** *meK'lin,* is a city of Belgium, situated on the Dyle River, fourteen miles southeast of Antwerp. Lying in the direct line of the German drive on Antwerp, early in the War of the Nations (1914) the city suffered a heavy bombardment which destroyed a considerable portion of it. Before its capture by the German forces it was a city of many fine squares, well-built houses surrounded by extensive gardens, and wide, regular streets—all spotlessly clean. It had, however, fallen far behind many of the other cities of Belgium in industrial enterprise and commercial activity. Its manufactures consisted chiefly of felt and straw hats, woolen stuffs and tapestries, furniture, carpets and large bells. Malines for centuries has been the religious metropolis of Flanders, and its monuments and curiosities are chiefly of a sacred nature. Its most noteworthy edifice, Saint Romauld's Cathedral, was built in the sixteenth century. It covers almost two acres and contains an altarpiece by Van Dyck and many other fine paintings and carvings. Population, 1910, 59,200. See WAR OF THE NATIONS.

MALLEABILITY, *mal e a bil' i ti,* a property possessed by most metals, which makes it possible for them to be hammered or rolled into thin sheets. Malleability, together with ductility, or the property of being drawn out into wire, is included under the general term of elasticity (which see). The degree of malleability increases with the temperature and with the purity of the substance. Lead, which is readily hammered out, and gold, which may be beaten into exceedingly thin gold leaf, are the most malleable metals. See MATTER, subhead *Properties of Matter.*

MALLORY, *mal' o ri,* STEPHEN RUSSELL (1813-1873), an American lawyer and political leader, the organizer of the Confederate navy. He had not only to organize and administer it, but to build the ships, provide as best he could for their ordnance and machinery; and create a naval force in a country whose ports were blockaded. Timber for the ships still stood in the forests; iron was in the mines, and there were no furnaces and workshops. Thus handicapped, he nevertheless created the Confederate navy. He was born at Trinidad, West Indies, where his father, a Connecticut shipbuilder, was temporarily located. The family removed to Key West, Fla., in 1820, and the son was educated at Mobile and at the Moravian Academy in Nazareth, Pa. He studied law, took an active interest in politics and early in life held a number of minor public offices, including inspector of customs at Key West, judge of Taylor County, and collector of the port of Key West.

From 1851 to 1861 he was United States Senator from Florida, and during most of the decade was chairman of the committee on naval affairs. He resigned when his state seceded from the Union, and President Davis at once appointed him Confederate secretary of the navy. He proved himself an efficient organizer, and held the office until the fall of the Confederacy. He was then held prisoner by the United States government for nearly a year, being pardoned by President Johnson in 1867. Thereafter he practiced law in Pensacola, which had been his home since 1858.

MALLOW, *mal' o,* a family of herbs and shrubs, all members of which secrete a sticky substance resembling mucilage. The hollyhock and hibiscus, both described in these volumes under their respective names, are familiar garden representatives, and another member of the family is the valuable cotton plant. The *common mallow,* whose trailing stems and pale-lavender blossoms are seen in the fields and along the roadsides throughout the United States, has become a weed. It bears a flat, circular fruit, formed from several united pods. When ripe these pods fall away separately, and are the "cheeses" which children take delight in eating.

The marsh mallow (which see) has been naturalized from Europe, and grows in the salt marshes of the Atlantic coast from Massachusetts to New Jersey. On its erect, branching stem, which grows from two to four feet high, are borne small clusters of pale crimson-pink flowers, which beautify the marshes of the Eastern coast in August and September. Its thick root, which secretes mucilage, is used in making candy. Another familiar species is the *musk mallow,* an escape from gardens. It has pale-rose or white flowers and takes its name from the faint, musklike scent of its foliage. The fiber is used in Syria for textile purposes.

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MALMÖ, *mahlm'uh,* a seaport town of Sweden, ranking next in importance to Stockholm and Gothenburg and lying on the opposite shore of the Sound from Copenhagen, in Denmark. It is situated on a level plain and was formerly strongly fortified, but the only fortification now remaining is the citadel where the Earl of Bothwell, husband of Mary, Queen of Scots, was imprisoned in 1573; this is now used as a prison. About 3,500 vessels leave the docks of this busy seaport each year in normal times, carrying the city's exports of grain, flour, gloves, chocolate, etc., to many European cities. Malmö is the terminus of eight railway lines. Its town house is an example of Renaissance architecture of the year 1546. Population in 1912, 92,340.

MALORY, *mal'o ri,* or **MALLORE,** SIR THOMAS, an English author, famous as the writer of the fine romance of chivalry, the *Morte d'Arthur,* which contains the stories of Arthur and the Round Table, afterward adapted by Tennyson in the *Idylls of the King.* Little is known about the author of these tales, except that he flourished in the latter half of the fifteenth century. *Morte d'Arthur* is the first important English prose romance, and was probably translated from the French. Caxton's prologue quaintly and fittingly describes the book:

> Herein may be seen noble chivalry, courtesy, humanity, friendliness, hardiness, love, friendship, cowardice, murder, hate, virtue and sin. Go after the good and leave the evil, and it shall bring you to good fame and renown. And for to pass the time this book shall be pleasant to read in; but for to give faith and belief that all is true that is contained herein, ye be at your liberty.

MALT, *mawlt,* the name given to grain that has been allowed to germinate or sprout for brewing and distilling purposes. The germination is effected by applying water and heat and is allowed to proceed only until the grain has become soft or mushy and has thrown out tiny sprouts. When the malt is crushed the starch in it is converted into sugar and gummy substances known as maltodextrins. The process is mainly for the purpose of rendering the various elements in the grain soluble in water so that some part of the food properties may pass into the liquid which is to be brewed or distilled.

The greater portion of all malt is made from barley, though small quantities of oats, wheat, rye, maize or rice are sometimes added in the making of beer or whisky. The barley is steeped in huge cisterns for about two days at a temperature of 60° F. and is then thrown in rectangular heaps on floors, where it germinates for about eight days. It is then dried in a kiln for three or four days at a temperature varying from 100° F. to 160° F. After the rootlets have been picked off, the grain is ready for the distilling or brewing process. One hundred parts of barley yield about ninety-two parts of dry malt, but the loss in nourishing value is far greater, probably as high as sixty per cent. See DISTILLATION; DISTILLED LIQUORS; ALCOHOLIC DRINKS.

MALTA, *mawl'ta,* an island in the Mediterranean Sea, between Sicily and the African coast, considered by its loyal people as "the flower of the world." In reality it is a land of yesterday, as it still retains many of its characteristics of a thousand years ago. It is one of the most important of the British dependencies and the headquarters of the British Mediterranean fleet; though small, it is one of the most important spots in the world. The area is about ninety-five square miles, and the additional dependencies include Gozo, Comino, Cominotto and several islets around the coasts of the larger islands. The shore is broken into several good harbors, the most important being at Valetta, the capital. As this is too small to accommodate the British fleet, a new breakwater was constructed in 1909. Malta has a bare, stony appearance, because of the absence of trees and on account of the stone walls which surround the gardens and fields to shield the crops from the violent winds. Although there are but few streams, water is easily obtained from numerous springs. Corn, cotton, potatoes, fruits and clover are raised in great quantities. Filigree ornaments, lace and jewelry constitute the leading articles of manufacture.

LOCATION MAP

During the winter months many tourists visit Malta, as it is interesting historically, as well as architecturally. The island was held by the Knights of the Order of Saint John of Jerusalem from 1530 to 1798, when it was surrendered to Napoleon (see KNIGHTS HOSPITALERS OF SAINT JOHN). In 1800 the English took it from the French and formally annexed it in 1814.

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Italian and English are the languages of the educated classes, but the people generally speak a mixture of Arabic and Italian. Population in 1911, including a garrison of about 8,000 British troops, 228,530.

MALTA, KNIGHTS OF, an ancient and illustrious Order founded in Jerusalem in 1048, and first called *Knights of Saint John,* or *Knights Hospitalers of Saint John* (which see). See, also, MALTA.

MALVERN HILL, BATTLE OF, the last of the Seven Days' Battles of the War of Secession, was fought at Malvern Hill, Va., fifteen miles southeast of Richmond, on July 1, 1862. The Federal army of the Potomac, numbering 80,000 men, was commanded by General McClellan, and the Confederate army of Northern Virginia, under General Lee, was about equal in strength. McClellan's communications with his base of supplies on the York River were cut, and he retreated under hardships and severe fighting to Malvern Hill, a strong position near the James River. The Confederates, flushed with previous victories, attacked him at this point; then ensued one of the fiercest battles of the war, lasting from early morning until evening, when the Confederates withdrew. The Confederate loss was about 5,000; the Federals lost about one-third that number. This battle ended the famous Peninsula Campaign. See WAR OF SECESSION.

MAMELUKES, *mam'e lukes,* Turkish slaves who were taken into Egypt and who became so powerful that they established a dynasty of sultans who ruled Egypt from 1250 to 1517. As slaves they were placed in the army and rose to become the military aristocracy of the country, eventually filling all the highest posts in the state. Armies of Mamelukes overran Asia Minor, Syria and Cyprus and ruled the Eastern Mediterranean. The Mamelukes resisted the invasion of Egypt by Selim I of Turkey, but they were utterly defeated and Egypt became a Turkish province in 1517.

As the Turkish power declined later, the Mamelukes became more haughty and arrogant, and were again practically independent. Napoleon encountered them in 1798 at the Battle of the Pyramids and defeated them. It was treachery, however, that led to their final downfall; in 1811 Mehemet Ali caused a general massacre of them throughout the country. Their ambitions had plunged Egypt into anarchy for years, and their extinction was regarded by the Egyptian people as a merciful deliverance from oppression.

MAMMALS, *mam'alz,* members of the highest class of vertebrate animals, which includes man and all the animals which resemble him in the most important points of structure. To this important group belong the largest of existing animals, the whales; also a number of others which man has domesticated and made to serve useful purposes, as the horse, ox, sheep, goat and dog. The distinguishing characteristic of mammals is their development and mode of nourishment during the earliest periods of life. Except among the lowest orders, the young are brought into the world alive and are fed upon the mother's milk. On account of this distinct characteristic of suckling their young the entire group is named *mammalia,* a word from the Latin *mamma,* which means *teat.* Of many interesting habits and characteristics common to the mammalian group, none is more important than the instinct to care for the young. Reaching its highest degree of development in the human species, it takes there the form of love, care and protection for children, making possible the family.

The skin of the majority of mammals is covered with hair of various kinds, ranging from fine wool to coarse bristles, and sometimes spines. The *Cetacea,* however, an order to which whales belong, are almost entirely lacking in hair, the thick skin and coat of blubber beneath it holding the heat within the body, and serving the purpose of a hairy covering. In general structure, the skeleton of mammals conforms to that of man. The cranium is diminished in proportion to the removal of the animal in classification from man.

A distinguishing characteristic of the mammalian skull is that it forms a single piece, composed of bones joined together; the lower jaw unites directly with the skull without the intervention of a connecting bone. The skull is attached to the vertebral column by two projections at the end of the occipital bone. Mammals never have more than four limbs; the front limbs are always present, but the Cetacea and a few other mammals have no hind limbs, or only the rudiments of these. Toothless mammals are found only in the lowest order, represented by the ant-eater (which see). All mammals have warm, red blood, which courses, from a four-chambered heart, through the arteries into all parts of the body, and returns to the lungs to be purified. Air is breathed into the lungs by all animals of this class, including whales and other water-inhabiting mammals. V.L.K.

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Consult Osborn's *Age of Mammals in Europe, Asia and North America;* Stone and Cram's *American Animals.*

Related Subjects. The mammals which are described in these volumes are listed under their various orders. Thus all the hoofed animals are indexed under UNGULATES, all the pouched animals under MARSUPIALS, and so on. The reader who wishes to make a special study of the mammals has but to consult the following articles:

Carnivorous Animals	Primates
Cetacea	Rodents
Edentata	Ungulates
Marsupials	

The following articles, which cannot be classified under the above headings, may also be consulted:

Bat	Seal
Duck-billed Platypus	Shrew
Hedgehog	Walrus
Mole	

MAMMOTH, *mam'oth,* the best known of the fossil elephants, characteristic of the glacial and postglacial periods. In general form and structure it differs little from the existing Asiatic elephant. Numerous mammoth skeletons have been unearthed in North Siberia and on the Arctic coasts, and they have been found in smaller numbers in Europe and in the United States. Some of the remains found in the Arctic regions have been so perfectly preserved in the frozen soil as to furnish food for the natives. From them we have learned the general appearance and proportions of the animal; it was not so large as is generally supposed, the average size not exceeding that of the present-day elephant. The tusks were long and curved, sometimes spiral, and the hair was heavy and dark brown, and in these respects it possessed characteristics peculiar to itself. One of the largest specimens has been preserved by the Chicago Academy of Sciences.

THE MAMMOTH

From the bones of the animal and other remains which have been found scientists believe the above to be a fairly accurate representation of the prehistoric beast.

MAMMOTH CAVE. Down in a wild and rocky ravine of the forests in Kentucky, about ninety miles south of Louisville, is a natural arched entrance, seventy feet wide, into a vast underground world, whose winding passages lead into many beautiful chambers with dome-shaped roofs. This huge cavern, known as Mammoth Cave, is the largest of its kind in the world; one may travel over 150 miles through its numerous passageways.

Rain water, laden with carbonic acid from the soil and air, has gradually carved out this wonderful cavern from hard rock by dissolving the limestone and leaving the firmer rocks. During the ages this water, seeping down through many layers, has formed Echo River, an underground stream over three-quarters of a mile long, which empties into Green River. Upon this stream, lying in River Hall, 360 feet below the earth's surface, travelers can board flatboats and be paddled along beneath an arched roof of rare beauty. If one should look down into the clear water at the side of the boat he might see small, white fish darting rapidly about. Other weird creatures, such as small crayfish, wingless grasshoppers, brown beetles and white spiders are found in the damp, lower parts of the cave, but a strange thing about all of them is that they are blind; living in the darkness they have no use for eyes, and Nature does not continue the gift of unused organs. In the winter thousands of bats seek the friendly shelter of the cave, hanging by their feet until spring, but even in summer many of them may be seen flying around the roof.

Ownership. According to local tradition the cave was discovered in 1809 by a hunter named Hutchins; it came into prominence during the War of 1812, when it supplied large quantities of saltpeter used in making powder. Some of the old vats used at that time may still be seen near the entrance. After being bought and sold by various people for its saltpeter deposits, one of the owners finally made the cave a place of exhibition to the public. In 1837, when guides began to conduct occasional visitors, there were so many unusual discoveries that the wonders of the cave attracted attention not only throughout America, but also in Europe. A young physician of Louisville, Dr. John Croghan, became so charmed with its beauty that he bought it in 1839 and subsequently spent large sums in its development. In 1916 a very old man was the only surviving heir; there is a movement on foot to make the whole region, at his death, into a national park.

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Various charges, according to the size of the visiting party, are made for the services of the guides; in large parties of twenty-five each one pays a dollar, while in small parties the fee may be three dollars for each person. A picturesque old hotel stands near by for the accommodation of tourists.

A Trip into the Cave. From a frowning ledge above the entrance a cascade of water leaps down, disappearing among the rocks without leaving any sign of a stream. Inside of the cave the air is cool and pure, the temperature

VIOLET CITY IN MAMMOTH CAVE

being about 54° F. in both summer and winter. Soon after passing the old saltpeter vats, the walks expand until the visitor enters the Rotunda, the first great vaulted room of the cave, from which a network of passageways leads off in every direction into vaulted chambers, some of which have wonderful stalactite and stalagmite formations (see STALACTITE AND STALAGMITE). The largest room, Chief City, so named because of the great number of Indian relics found in it, has an area of two acres, and a roof 125 feet high. In this room Indians formerly held their councils. However, the most beautiful section of the cave, Violet City, which was discovered in 1908 and named after the wife of one of the owners, is much smaller than Chief City, being 250 feet long and 125 feet wide, but it contains hundreds of most remarkable stalactites of onyx, varying in size from minute needles to those several feet in length. One group is so attuned that, if struck by some hard substance, the tones resemble those of a chime of bells, and simple tunes can easily be played on them.

In Gothic avenue are other stalactites of remarkable interest, such as those at the Bridal Altar, where four columns eight feet high have formed by the union of stalactites and stalagmites. A place of special interest is Star Chamber, whose ceiling of black manganese is studded with innumerable crystals of snowy gypsum, which resemble stars in the artificial light thrown upon them by the guides. When one realizes that it takes five years to form a deposit the thickness of a wafer upon a stalactite, he finds it almost overwhelming to estimate the number of centuries during which this natural wonder of the world has been forming. E.C.

Consult Hovey's *Mammoth Cave of Kentucky*, and his *Celebrated American Caverns*.

MAN, the most highly-organized animal in the scale of nature, belongs to the first order of mammalia (see MAMMALS). This order is called *primates* (from the Latin *primus*, meaning *first*). Man is superior to all other animals particularly in that he has a reasoning mind and in that he speaks an intelligible language with which he can impart his thoughts readily. These powers are not possessed by any other animal. This highest group of animals includes, besides man, apes and monkeys. In mentality, man ranks far above gorillas, chimpanzees and orang-utans, the highest order of apes. Physically, man differs from other animals of the same class in that he walks erect; the feet are not adapted to grasping or seizing, the teeth are close together, and the bones of the face project downward rather than outward and are below the brain. The most marked difference, however, is the larger cranial capacity and the much greater volume of the human brain.

Evolution of Man. Excavations made in caverns in England and on the continent of Europe show distinct traces of man which give him claim to a race history covering many thousands of years. Stone implements have been found with but little variety of form, rudely chipped into shape and neither ground nor polished. Those of a later period are polished or ground to a sharp edge. These objects belong to the Stone Age, and scientists have been able to form a fairly clear idea of man's mode of life and progress from these deposits. It is supposed that the race of man has existed since the Glacial Period (which see), but how long before the Glacial Period mankind lived, and how the race originated and became distributed over the earth, are questions which scientists have been unable to answer. The Darwinian theory is that all present races originated from one parent stock and that man is the direct descendant of some form of anthropoid (resembling man) ape (see EVOLUTION). Some who accept the Darwinian theory believe that the Creator especially endowed the hu-

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man race with a soul. Others think that the human race developed from separate sources and refuse to believe in a mind and soul of divine origin. For man's conquest of the earth see CIVILIZATION. See, also, RACES OF MEN.

MAN, ISLE OF, an island of the Irish Sea inhabited by Celtic people whose customs and history have been vividly presented in the writings of Hall Caine. This popular English novelist resides at Greeba Castle, one of the in-

LOCATION MAP

teresting features of the island. The Isle of Man lies midway between England and Ireland and fifteen miles south of Scotland. Its name comes from the Manx word *Mannin,* meaning *the middle.* It has an area of 227 square miles, and its coastal scenery is bold and picturesque. A mountain chain extends nearly its entire length; the highest point is Snaefell, 2,034 feet above sea level. Lead and zinc are mined extensively, and silver is found in considerable quantities. Fishing and agriculture are important industries.

The principal towns are Douglas, the capital and chief seaport, Castletown, Peel and Ramsay. A fine fleet of swift steamers affords communication between Douglas and Liverpool. Among the ruins of interest are the Castle Rushen, founded in 947 and the most perfect building of its date now existing; Peel Castle, dating from the twelfth century; numerous relics of the Druids (which see), and Runic monuments throughout the island (see RUNES).

The island, inhabited chiefly by the Manx, a people of Celtic origin, was purchased by the British government early in the nineteenth century. It has a constitution and government of its own, and to a certain extent is independent of the imperial government, although it is ruled by a Lieutenant-Governor appointed by the English Crown. The legislative authority rests with the Legislative Council and the House of Keys, or Representatives. The native Manx tongue is still spoken in the northwestern parishes and along the west coast, and it is taught, with English, in the parish schools. Population, about 52,000.

MANÄOS, *mah nah' ohs,* the capital of the state of Amazonas, in Brazil, a city of nearly 80,000 people in 1917, is situated on the north bank of the Rio Negro, twelve miles above its junction with the Amazon, far up the course of that mighty river, in the maze of woods and streams. It is one of the marvels of modern city building, "more cosmopolitan than Para," and "essentially an American city." It is 908 miles by river from the Atlantic Ocean, 850 miles from Belem (Para) by the shortest route, about 3,800 miles from New York and about 5,000 miles from London. The city is in latitude 30° south, 106 feet above the sea level. The great variation of the river level, with its seasonal rise and fall of thirty-three feet, necessitates floating docks and bridges. Manäos has electric lights and cars and good waterworks. Its customhouse, municipal hall, botanical garden, museum, public library, theater, etc., tell of lavish expense, civic pride and modern spirit. Public elementary schools are provided; there are good private schools, and a lyceum for secondary instruction.

The first small settlement of white men began here in 1660, the place being called São José de Rio Negro and later Barra do Rio Negro (referring to the river bar). This insignificant village rose in 1850 to be the seat of the wild territory of Amazonas and at that time took its present name. Two years later a navigation company was organized, and in 1853 regular commerce began. The recent and remarkable story of Manäos starts with 1878, when the export tax on direct shipments was lowered.

MANATEE, *man a te',* or **SEA COW,** a large, seal-like animal which is supposed to have suggested the mermaid to the primitive mind (see MERMAID). It is native along the coasts of South America, Australia and Africa, and frequents lagoons and the estuaries of rivers, browsing on aquatic plants, among which it often stands upright on the curve of its tail. The manatee is an ungainly animal, from eight to ten feet in length and without hind legs, but

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it is equipped with forelegs modified into swimming paws. Its skin is tough, like that of an elephant, grayish-black in color and sparsely

THE MANATEE

provided with bristles. Its upper lip, which is cleft, closes on the weeds and water grasses like a pair of pliers. The animal has been much hunted for its flesh and oil.

MAN'CHESTER, one of the three great English industrial cities, and the center of the most extensive manufacturing district in the world. Although cotton goods are the chief articles of manufacture, about 700 other industries are represented there. In recent years many of the mills and workshops have been removed to the populous suburban sites, so the center of Manchester and an ever-widening circle around it are now devoted not so much to production as to the distribution of its manufactures to every part of the civilized world; for the enterprise of its merchants has kept pace with the energy of its manufactures. In the heart of the city are many fine warehouses and shops, and prosperity was evident everywhere, before the outbreak of the War of the Nations. That struggle affected the city as it did the entire kingdom.

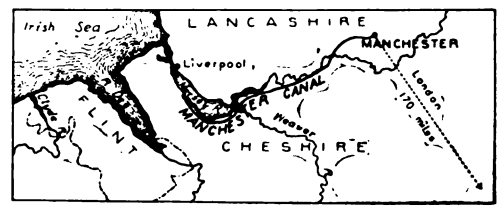
Manchester is a corporate parliamentary borough of Lancashire, on the Irwell River, thirty-two miles northeast of Liverpool. On the west bank of the Irwell is Salford, connected with Manchester by sixteen bridges, so that the two boroughs are virtually one city. Canals and railways radiate from the center of Manchester in all directions. The Manchester Ship Canal (see below) connects the city with the estuary of the Mersey River, at Eastham.

The city is proud of its many fine public buildings. The town hall, or municipal building, in Gothic architecture, is one of the finest of the modern buildings in England; its clock tower, 286 feet high, contains a chime of twenty-one bells. Other edifices of note are the Royal Exchange, the Assize Courts, and the Royal Institution containing a gallery of paintings, a school of design and a lecture theater. None of the large cities of the British Isles is better furnished with fine libraries and reading rooms, and the facilities for education have been greatly extended and improved within recent years. The Victoria University is of high character; it has an excellent library and a museum of natural history.

The most notable public institution is Chetham's Hospital, founded under the will of Humphrey Chetham for the education of poor boys. Its library, which was the first free library in Europe, contains over 40,000 volumes. Chief among the many fine statues and monuments which grace the city is the Albert Memorial, in Albert Square, facing the town hall. The sanitary condition is far from satisfactory, and vigorous efforts are constantly being put forth to remedy this unfortunate condition, which is caused by the smoke nuisance and the disease-bearing Irwell, which flows through a densely-populated part of the city.

The history of Manchester is legendary down to the tenth century, when the town was devastated by the Danes. In the twelfth and thirteenth centuries the woolen manufacture began to develop. Since the introduction of cotton-spinning machinery, toward the close of the eighteenth century, the city's progress has been rapid. It is represented in Parliament by six members, and Salford by three members. Population in 1911, 714,330; of Salford, 231,380.

Manchester Ship Canal, an English canal that converted the inland town of Manchester into a seaport, and which has enormously increased industrial and commercial activity. It extends from Manchester to the Mersey estuary at Eastham, six miles above Liverpool.



MANCHESTER SHIP CANAL

The canal is 35.5 miles long, about 840 feet wide and twenty-six feet in depth. It was ready for traffic in January, 1894, the official

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opening ceremony taking place on May 21, when Queen Victoria visited Manchester. It is in direct communication with all the barge canals of the kingdom, and through it the largest seagoing boats enter the heart of the city, which has six miles of wharfage and 100 acres of dock accommodations. The cost of construction was $75,000,000, and the annual traffic receipts now amount to over $3,000,000.

MANCHESTER, N. H., the largest city of the state, and its most important manufacturing center. It is one of the county seats of Hillsboro County, and is situated in the southeastern part of the state, and is on the Merrimac River, at the point where it receives the Piscataquog River. Concord, the state capital, is seventeen miles north, and Boston is fifty-six miles south. Railroad transportation is provided by the Boston & Maine; interurban lines extend from the city to neighboring towns. Population, 1910, 70,063; in 1916 (Federal estimate) 78,283. The area of the city is about thirty-one square miles.

Location. The city occupies both banks of the two rivers, at an elevation of ninety feet above the water, and commands a fine view of river and valley. Lake Massabesic lies on the east side of the city. The park reservation of 200 acres is divided into fifteen parks. A noticeable feature of Manchester is the pleasing aspect of the residential district of the industrial classes, the rule being detached dwellings and corporation homes, instead of tenements.

Buildings and Institutions. Manchester has a number of fine buildings, the most conspicuous being the Federal building, the county courthouse, the Roman Catholic Cathedral and the public library, containing about 46,000 volumes. Notre Dame, Sacred Heart and Elliott hospitals, Saint Joseph's and Saint Patrick's orphanages, and Saint Vincent's and Saint Patrick's homes for the aged are worthy of note. Besides the public and parochial schools, there are Saint Mary's Academy, Saint Anselm's College, Saint Augustine's Academy and the state industrial school.

Manufactures. Above the city the Merrimac River has a drop of fifty-four feet, called the Amoskeag Falls, which furnishes abundant water power for manufacturing purposes; to these falls the city owes much of its prosperity. Large capital is invested in the manufacture of cotton goods, the city's chief product. The thirty-six cotton mills have a total annual output of 246,000,000 yards, and with the woolen mills employ about 15,000 people. Boots and shoes are also important products, about 7,500 people being employed in their manufacture. The annual value of these and lesser products is estimated at $46,000,000.

History. The first settlement by white men on the site of Manchester was made in 1722 by Scotch-Irish immigrants. For a number of years it was known as Harrytown, and with portions of Chester and Londonderry was incorporated as the township of Derryfield in 1751. In 1810 the name was changed to Manchester on account of its manufacturing possibilities, and in 1846 the city charter was granted. In 1853 the villages of Amoskeag and Piscataquog were included within the city's limits. Manchester is the birthplace and burial place of the fearless military leader, General John Stark, and in the park overlooking the Merrimac River a monument has been erected to his memory. J.F.S.

MANCHURIA, *man choo're ah,* a province of about 363,600 square miles, in Northeastern China, the original home of the Manchu, who established the Ta Ching or "Great Pure" dynasty which reigned in Peking from 1644 to 1912. The Chinese were made by the Manchus to wear the *queue* as a symbol of subjection, but it came in time to be regarded as an essential part of dress. At the present time the population of 17,000,000 is largely Chinese, and the country is politically a dependency of China. The foreign relations of Manchuria are entirely in the control of the central Chinese government at Peking, and the local affairs of the three divisions of the province are in the hands of provincial governors.

Manchuria is a land of the richest natural resources, but only about one-fifth of its land is under cultivation. The country is very mountainous, the melting snows of the Shan-a-lin, or Long White Mountains, feeding the large rivers which water immense crops and furnish a means of carrying them to market. These mountains, rich in coal, gold, silver, copper, lead, iron and soda, are covered by extensive and valuable forests of pine, oak, elm and walnut. The Fushun coal mine, operated by the government, is believed to be one of the largest in the world. There are many hunters and trappers in the mountains, who collect great quantities of skins of tigers, bears, wolves, deer, foxes and martens. West of the Shan-a-lin range lies a great fertile plain, where immense crops of beans, peas, rice, tobacco and Kaoliang are raised. Kaoliang, raised for home use, is a grain, eaten by the Chinese as a cheap substi-

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tute for rice; the stalks are used as building material and fuel, and the leaves are made into hats, baskets and brooms.

There are three important railroads in Manchuria, but these, with the country roads which are very crude and sometimes impassable, cannot take all of the crops to the markets, so the boats and junks in summer and the ice sledges in winter carry great loads down to the big cities on or near the coast.

The treaty after the Chinese-Japanese War (which see) in 1894-1895 gave Japan Port Arthur and one other important port. Russia, France and Germany interfered and forced Japan to give up this concession, for which service Russia obtained a twenty-five year lease of the port and other important privileges. During the Boxer uprising in 1900, Russia sent troops into Manchuria, which were not withdrawn, and the Russo-Japanese War resulted. The Treaty of Portsmouth at the close of the war transferred to Japan this Russian lease of the Liaotung Peninsula, which expires in 1923, when it and the other rights granted Russia will revert to China. See RUSSO-JAPANESE WAR.

Buddhism is the popular religion of Manchuria. In spite of the great natural wealth of the country, the people live in terrible poverty and ignorance. Y.T.T.

For location, see colored map, in article Asia. Consult Hosie's *Manchuria, Its People, Resources and Recent History.*

MANDALAY, *man'da lay,* a picturesque city of India founded in 1860, which has been the capital of Upper Burma since the British conquest of the country in 1885; for twenty-five years previous it was the ruling city of the independent kingdom of Burma. It is situated on the left bank of the Irrawaddy River, 350 miles north of Rangoon, with which it is connected by rail. In 1892 a disastrous fire destroyed nearly the whole of the city, so many of the buildings are of modern construction, while the fine, shady streets are well lighted. In the center of the city, which covers an area of six square miles, is a quaint walled town, now called Fort Dufferin and used as a British cantonment, or military station. Within the wall are the royal palaces, made chiefly of teakwood, the government house and the hall of justice. On the outskirts of the city there are numerous monasteries, temples and pagodas, the most famous being the Aracan Pagoda, containing a brazen image of Buddha twelve feet high. Silk-weaving is the most important industry of the 138,300 inhabitants.

Kipling has immortalized the city in his poem *Mandalay,* the opening stanza of which follows:

By the old Moulmein Pagoda, lookin' eastward to the sea,
There's a Burma girl a-settin' and I know she thinks o' me;
For the wind is in the palm-trees, and the temple bells they say:
"Come you back, you British soldier, come you back to Mandalay!"

MANDAMUS, *man da'mus,* a Latin word meaning *we command,* is a term in law applied to a writ issued by a superior court to compel an inferior court, official, corporation or individual to perform a public duty definitely prescribed by law. The writ of mandamus is issued only when the ordinary channels of legal procedure are closed to the parties injured by the neglect of duty; its purpose is to secure justice and to prevent disorder in the absence of other legal remedies. For instance, the taxpayers of municipality may petition the proper court to direct a writ of mandamus to the mayor requiring him to close the saloons on Sunday if the law specifically forbids liquor-selling on that day. If the matter in question is one in which the performance of duty is left to the discretion of the official the writ of mandamus cannot be used as a remedy. That is, the duty must be clear and unquestioned, not a matter of judgment. See WRIT; INJUNCTION.

MAN'DAN, a tribe of vigorous, interesting Indians of Siouan stock, who have been almost wiped out by epidemics of smallpox and by raids by the Sioux. Only about 200 yet remain, and they live on the Fort Berthold Reservation in Western North Dakota. Little is known of their early history except that they were gradually crowded north along the Missouri River, and finally, in 1837, were reduced to one village on the Knife River. In 1870 they were living near the mouth of the Heart River, a tributary of the Missouri. Their houses, built of logs, were low and circular, roofed and chinked with mud and grasses. Great herds of buffalo on the plains supplied them with meat and warm robes for the long, cold winters. The crudely-dressed hides, when stretched between posts, made comfortable beds; placed over willow frames, they formed queer, tub-like canoes. The Mandans raised beans, corn, sunflowers and tobacco.

MANDARIN, *man'da rin,* the English name applied to high officials of China, military, judicial and civil, before the republic was estab-

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lished. The Chinese equivalent is *kwan,* meaning *a public character.* Mandarins were of different rank, and their relative positions were denoted by the color of the buttons on their ornamental caps. Governors and generals displayed buttons of red coral; lieutenant-governors and judges, blue stones; lower officers, white, crystal and yellow. Each mandarin wore an official robe; that of the military man being embroidered with representations of beasts; that of the civil officer, with birds; the judicial robe was plainer. By law a Chinaman could become a mandarin by promotional examinations. One could not hold the position of mandarin in his native province, could not marry in the province to which he was assigned, and could not acquire property in it. Tenure of office in one province was not longer than three years.

MANDEVILLE, *man'de vil,* SIR JOHN DE, traditional author of a fourteenth-century book of travels, whose marvels have delighted many a reader. The narrator gives what purports to be an account of his wanderings in Turkey, Arabia, Egypt, India, the Holy Land, and other parts of the East. In reality the book is a compilation based upon a book of travels by William of Boldensele (1336), the journal of Friar Odoric of Pordenone (1330), and other medieval writings. The book appeared originally in French, and there are three English versions extant. According to best authority, the real author of the travels was one John of Burgoyne, who died at Liége in 1372.

MANDINGO, *man ding'go,* a West African group of negroes, who live in the region extending from the Senegal and Upper Niger rivers to Monrovia, on the coast of Liberia. They number several millions and are divided into very numerous tribes, each of which has its own dialect. The Mandingo, who were brought to an acceptance of the doctrines of Mohammed many centuries ago, have advanced far from their original state of savagery—their food, dress and homes being those of a civilized people. They are lean and athletic in build; their skin varies from olive to black, and their features often show a marked departure from the ordinary negro type.

MANDOLIN, *man'doh lin,* a musical instrument of the same general character as the lute, and like the latter, an instrument of great antiquity. It has from four to six double strings, is gourd-shaped, and terminates in a neck fitted with many frets. It is played with a plectrum, or pick, of tortoise shell, whalebone, or other flexible material, which is held between the thumb and first finger of the right hand. A long note is produced by rapid, successive strokes on a double string, the tone produced having a peculiar tremulous quality. The mandolin is of Italian origin, the chief varieties being the Neapolitan with four double strings,

MANDOLIN

and the Milanese with five. Though it has never been a regular orchestral instrument, music for the mandolin has occasionally been introduced into operatic scores as an accompaniment for serenades. A notable example is the music for the celebrated serenade in Mozart's *Don Juan.* See LUTE.

MAN'DRAKE, a genus of plants with broad leaves and bright-yellow flowers. For many years the root was employed in medicine, and

THE MANDRAKE, OR MAY APPLE
Above, a bud and cross section of flower.

has long been an object of much superstition among ignorant people. According to an old and strange fancy the mandrake shrieks when pulled from the ground, and if properly consulted as an oracle brings good luck to the

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household. Shakespeare in *Romeo and Juliet* says in Juliet's farewell:

And shrieks like mandrakes torn out of the earth
That living mortals hearing them, run mad.

It is a native of Southern Europe, and the name is derived from the peculiar shape of the forked root, which supposedly grew in half-human form. In ancient times the root was used as a narcotic and anesthetic and in "love potions."

In the United States and Canada the *may apple,* a species of plant of the barberry family, is often called the mandrake. See MAY APPLE.

MANDRILL, *man'dril,* a species of ferocious baboon, which nature has made so repulsive that it is said to be the most hideous of all living animals. It inhabits Guinea and other portions of West Africa, where the natives regard it with extreme dislike because of the damage it does to crops. The mandrill grows to great size, has a doglike muzzle, eyes like a pig, and a misshapen nose. The high cheeks are colored a cobalt blue, and are scarred with scarlet furrows; patches of red appear also on the lower parts of the body. These animals live in groups, and like all baboons, they walk on all fours. If kept in captivity until full grown they become very savage, and even the young show few agreeable traits. See APE; MONKEY; BABOON.

MANGANESE, *man'ga neese,* an extremely hard, grayish-white metal, of little value itself, but of great importance in the steel industry. The grade of steel depends on the amount of manganese, the manganese greatly increasing its elasticity and hardness. Alloyed with copper and zinc, it forms manganese bronze of many uses. Other compounds of the metal are important in the manufacture of flint glass, dry batteries and pottery. Its use in the manufacture of chemicals is decreasing. It occurs in nature in iron, silver and lead ores, and in many mineral waters, cereals and vegetables used for food. The most abundant deposits are found in Southern Russia, Brazil and in the United States in the Piedmont Mountains of Virginia and Georgia. As the mineral pyrolusite it was known by the Roman writer Pliny, who thought it to be an iron ore. The name manganese was given it in 1808.

MANGE, *maynj,* a disease of the skin resembling itch, affecting horses, dogs, cattle, and sheep. It is caused by a tiny parasite, which makes its way under the skin and lives in the hair follicles. The body soon becomes spotted with pimples and scabs, which itch and cause the victim to suffer great discomfort. To cure the disease the microbe must be destroyed, and the most successful way of doing this is by plunging the victim into a tank or tub containing an antiseptic solution, containing such substances as lime and sulphur, carbolic acid or tobacco. Poisonous preparations of mercury and arsenic should not be used. Mange is contagious, and requires care to prevent its spread. Various kinds of skin disease are often confused with it.

MANGO, *mang'go,* from a Malay word meaning *tree fruit,* is a kind of evergreen tree native to India and the Malay Peninsula, distinguished by its luscious fruit. The mango is a tree of rapid growth, attaining a height of about forty feet and crowned with a dense foliage of lustrous, tapering leaves from six to eight inches in length. The flowers are reddish-white or yellow in color. When the tree is cultivated, the smooth kidney-shaped fruit often weighs a pound or more. Different varieties range in size from that of a plum to that of an apple. The fruit is sweet or slightly acid in flavor, and is highly prized as a dessert. The kernel, too, is nourishing and is eaten roasted

HOW MANGOES GROW

by the natives when food is scarce. The unripe fruit is used for pickles, sauces, etc. Mangoes grow so profusely and so continuously in the West India islands, where the season is eight months long, that their production has tended to make the natives indolent and nonprogressive. One may live there without working.

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The fruit is therefore not an unmixed blessing to the West Indians.

Introduced into Jamaica in 1782, the cultivation of the plant was extended throughout the West Indies and to Southern Florida and California. The mango is propagated either from seed or by grafting. In Florida, eight-year-old trees sometimes bear 5,000 fruits a season. The fruit is found in Northern markets in August and September.

MANGROVE, *mang'grohv,* a genus of shrubs or trees which spread thickly and abound on the shores of lakes and rivers in all tropical

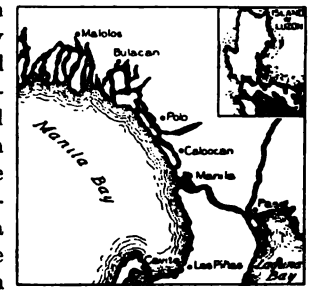
THE MANGROVE

countries. The name is derived from the Malay word *manggi-manggi,* and is sometimes written *mangrowe.* These trees have the remarkable habit of throwing out roots in all downward directions on the lower part of the trunk, and these take root along the muddy shore. By this means the mangrove spreads in monotonous green thickets, sometimes for hundreds of miles; at their roots new soil is slowly formed from mud brought in by the waves and from falling leaves, etc., and in time even islands of considerable size may appear. The red mangrove is found along the coasts of Florida, Lower California and Mexico. It is a round-topped tree, about twenty-five feet high, with thick, oval leaves and the drooping roots referred to; in the last respect it is somewhat like the banyan tree, although the latter grows in firm soil. The fruit is sweet, and a wine is made from it; the wood is used for fuel and wharf piles, and can be given a high polish. The astringent bark is used in tanning.

MANHATTAN, *man hat'an,* **ISLAND,** an island at the head of New York Bay, thirteen and one-half miles long and two and one-half miles broad at the widest part, covering an area of twenty-two square miles. It is now coextensive with the main residence portion and the commercial and financial center of New York City. The first Dutch Governor-General, Peter Minuit, acquired this island from the Indians in 1622 for the sum of $24 in merchandise; it then contained 200 people, living in thirty-one log houses with bark roofs. The ground value of the island to-day is upward of three billion dollars.

The history of Manhattan Island since this memorable purchase is told under the heading New York City.

MANILA, *ma nil'a,* in Spanish *mah ne'la,* the capital of the Philippine Islands, situated on the western coast of the island of Luzon, at the head of Manila Bay. It is divided into two portions by the little River Pasig, on the south bank of which stands the sleepy old town, founded in 1571, surrounded by walls still in good condition and forming one of the best existing models of a walled town of the period. Within the wall are grouped the cathedral, the archbishop's palace, numerous churches and monasteries, the government building and many old-time Spanish houses. On the north bank are the modern suburbs, and the commercial and native quarters. The palace of the Governor-General is in the riverside suburb of Malacañan. Since the United States has taken control, it has introduced a modern system of sewage disposal and brought down from the mountains east of the city a supply of pure water. The mouth of the Pasig has been deepened so as to admit ocean-going vessels of moderate draft. The largest transpacific liners come directly to the new piers in the magnificent new harbor created by Uncle Sam.



LOCATION MAP
The small corner map pictures the entire island of Luzon.

Manila was the first city of the Philippines to develop town-planning on systematic lines. Recently the old city walls together with the surrounding moats (which have been filled in) have been made a part of the park system.

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Among the new buildings, the most notable are the Manila Hotel, the Army and Navy Club, Elks Club, Episcopal Cathedral, the General Hospital, the normal school and the Y. M. C. A. The famous Jesuit Observatory stands in a garden on the outskirts of the city. Near it rise the new buildings of the university. The native houses are generally constructed of bamboo and thatched with leaves of the nipa palm. Instead of glass for windows, a flat shell of a large oyster is substituted, and the window-frames all slide horizontally. The shells admit a soft light and exclude the great heat. Since 1913 the city and its suburbs have been lighted by electricity.

The manufacture of cigars, which gives employment to thousands of men, women and children, is the most important industry. Manila also manufactures malt and distilled liquors, cotton fabrics, clothing, foundry and machine-shop products, wagons, furniture and boots and shoes. The city is the greatest hemp market in the world; about 175,000 tons are exported from the Philippines each year, nearly all of which is shipped from Manila. The imports consist chiefly of rice, cotton goods, chemicals, machinery, metal goods and wine, and trade is carried on chiefly with China, the United States and Great Britain. Hemp, sugar, tobacco, coffee and dyewoods are leading articles of export.

Manila was founded by Legaspi, the conqueror of the Philippine Islands, in 1571. It suffered severely by the earthquake of 1863. The Spaniards surrendered Manila to the American naval and military forces August 13, 1898 (see SPANISH-AMERICAN WAR). At that time the Philippine insurgents were surrounding the city. In the early part of 1899 they broke through the American lines which invested the city and burned a small portion of the native quarter. In August, 1901, the military government gave place to the new civil rule. Manila was one of the first of the Philippine cities to adopt the commission form of municipal government. The commission which governs the city has six members, four of whom are appointed by the Governor-General; two natives are elected by popular vote. Under this form of jurisdiction Manila has been able to make rapid progress in practical, sanitary and esthetic development. Population, 1914, 266,940; of this number, 236,940 were Filipinos. E.B.H.

MANILA HEMP, the fiber of a species of plantain used extensively in rope-making. See HEMP.

MANILA BAY, BATTLE OF, a naval battle of the Spanish-American War, the first important engagement of that conflict. It was fought in the Bay of Manila, in the Philippine Islands, May 1, 1898, between an American fleet under Commodore (later Admiral) George Dewey, and a Spanish fleet of about equal strength under Admiral Montojo, the latter supported by land batteries. The American fleet, which at the declaration of war was in Chinese waters, had proceeded to the Philippine Islands and had entered the harbor of Manila during the night of April 30. The following morning Commodore Dewey attacked the Spanish fleet, and in a battle lasting several hours, ten Spanish ships were sunk or destroyed and over 600 Spanish sailors were killed or wounded. The Americans did not lose a ship or a man, and only six were wounded. Dewey was soon reënforced by land troops under General Merritt, and on August 13 the city of Manila was taken. Thus the Philippine Islands, which had been held by the Spanish since the days of Magellan, came into the possession of the United States. See PHILIPPINE ISLANDS; SPANISH-AMERICAN WAR.

MANISTEE, *man is te'*, MICH., the county seat of Manistee County, is noted for its immense product of salt and sawed lumber, especially shingles, in which it surpasses any other city in the United States. Poles and Scandinavians comprise the foreign element of the population, which in 1910 was 12,381. Manistee is situated on Lake Michigan, at the mouth of the Manistee River, about midway between the northern and southern borders of the state, thirty miles north of Ludington and 110 miles northwest of Grand Rapids. Chicago is 180 miles southwest by water. The city has fine transportation facilities, through regular steamship service and the Flint & Pere Marquette, Manistee & North Eastern, and Michigan East & West railroads. In 1840 the first settlement was made by John and Joseph Stronoch; in 1869 it became a city, and in 1914 the commission form of government was adopted. Heavy losses were sustained by fire in 1861 and in 1871. The area is a little less than three square miles.

Manistee is an important shipping point on Lake Michigan. It has a good harbor, and the Manistee River, its outlet, is usually free from ice in winter. About two and a half million barrels of salt are shipped from here annually, and also many millions of feet of sawed lumber. Underlying this locality at a depth exceeding 1,900 feet is a stratum of rock salt

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thirty-two feet thick, and the brine is pumped through openings not more than six inches in diameter.

Besides the large salt and lumber industries, the city manufactures furniture, sole leather and foundry products. The most notable buildings are the $80,000 Federal building, an opera house, a $50,000 Carnegie Library, the Masonic Temple, the Elks' Temple and a fine courthouse. Features of interest in the vicinity are Orchard Beach, a lake resort, with a theater, and the Vacuum Pan Salt Works at Eastlake, a suburb, said to be the largest salt enterprise in the world. H.S.C.

MANITO'BA, the most easterly of the western provinces of Canada, is situated in the geographic center of the land mass of North America, being about equally distant from the Atlantic and Pacific Oceans and the Arctic Ocean and the Gulf of Mexico. It is often considered to be the gateway to the great Canadian Northwest. The name comes from two Indian words, *manito,* meaning the *great spirit,* and *waban,* meaning *the narrows,* the name especially applied to the narrow part of Lake Manitoba. The wind, when rushing through the Narrows, makes a peculiar sound; the early Indians believed this to be the voice of God, so they named the place *Manito-Waban,* or the *narrows of the great spirit.* The name was changed to *Manitoba* by the early settlers.

The province extends 300 miles along the northern boundary of the United States, bordering a part of Minnesota and North Dakota. It extends northward to the 60th parallel of north latitude; the line separating it from Saskatchewan on the west is 770 miles long, or nearly twice the length of Illinois. Ontario bounds it on the east, and the northeast corner for more than 300 miles is washed by the waters of Hudson Bay. The area of the province is 251,832 square miles, of which 19,906 square miles are water. It is about the size of Alberta or Saskatchewan.

Previous to 1912 the form of Manitoba was that of a square, and the area was a little less than 74,000 square miles (see map, in illustrations, page 3629). In that year the Dominion government divided the territory of Keewatin between Manitoba and Ontario, extending the boundaries of the province to their present limits. The addition is sometimes referred to as New Manitoba. Manitoba is larger than any state in the American Union except Texas. It is a little more than three times the size of Minnesota and a little larger than Montana and Colorado combined. Excluding the provinces of Bosnia and Herzegovina, Austria-Hungary could be placed in Manitoba with 10,000 square miles to spare.

The People. There were but few white inhabitants in Manitoba previous to 1870. Since that date the population has increased rapidly, and in 1911 the province had a population of 455,614, an average of 6.18 inhabitants to the square mile. Since the census was taken a large number of immigrants have entered the province. Most of the older inhabitants are of English and Scotch descent, but recent immigration has added a number of nationalities from Central and Southern Europe. In 1915 there were 11,000 Indians in the province.

Religion. The population of Manitoba is more evenly distributed among the leading religious bodies than in some of the older provinces. The leading denominations in the order of their membership are Presbyterian, Anglican (Episcopalian), Baptist, Roman Catholic, Methodist, Lutheran and the Greek Church. A number of other denominations are represented, but their membership is relatively small.

Surface and Drainage. The eastern part of Manitoba belongs to the Laurentian Plateau and has a rocky, uneven surface, but no mountains or high hills. It is well wooded and contains numerous lakes. The remainder of the province is a portion of the Great Plain of North America. The southern and central portions are believed to be a part of the bed of a

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great lake that in some past geological age covered all this region, and which geologists call Lake Agassiz. This region is level and is a continuation of the great valley of the Red River of the North, which has its origin in Minnesota. West of this valley the surface consists of rolling prairie that increases slightly in elevation as it approaches the western boundary where the higher elevations are known as the Riding and Duck mountains. This ridge has an elevation of about 500 feet where it enters the province from North Dakota.

LOCATION MAP
Showing, also, the size of Manitoba as compared with the whole Dominion.

Lakes and Rivers. Manitoba has three large lakes and many small ones. Lake Winnipeg, situated in the east-central part of the old province, is the largest. Next in size is Lake Winnipegosis, 150 miles long and 2,086 square miles in area. Lake Manitoba, south of Lake Winnipegosis, is 135 miles long and has an area of 1,817 square miles. These lakes lie west of Lake Winnipeg. The shores are low, and the waters are murky, owing to the silt discharged by the inflowing streams. The smaller lakes are scattered over the province.

The drainage of the province is towards the northeast, into Hudson Bay. The most important stream is the Red River of the North, which crosses the international boundary on a line separating Minnesota from North Dakota and flows into Lake Winnipeg. The Assiniboine, its chief tributary, traverses the province from west to east and joins the Red River near Winnipeg. The greatest river flowing eastward from the Rocky Mountains—the Saskatchewan—falls into Lake Winnipeg on its western side, in Manitoba. Winnipeg River, the outlet of the Lake of the Woods (which see), flows into Lake Winnipeg and drains the southeastern part of the province. The Nelson River drains Lake Winnipeg into Hudson Bay. Other important streams flowing into this body of water are the Hayes in the eastern part of the province and the Churchill in the northern part. Many of the smaller streams furnish water power which is available for operating mills and electric plants.

Climate. The winters are long and cold, the thermometer sometimes registering 40° or 45° below zero, but the atmosphere is dry and clear, and the severity of the temperature is not noticed as much as it is in a more humid atmosphere. The summers are short, but many warm days are experienced. The high latitude gives this region many hours of sunlight, and vegetation grows with wonderful rapidity. The mean annual temperature is 33° F., with extremes of 40° to 50° below zero to 95° above. The change from winter to spring and summer is very rapid, and frequently an April that is wintry at the beginning ends with conditions approaching summer. The mean annual rainfall is 17.43 inches, but three-fourths of it occurs during the growing season, so there is ample moisture for agriculture. The ground is usually covered with snow from December to March.

Plants and Animals. The eastern and northern parts of the province contain forests of spruce, jack pine and tamarack, but in the southern and central prairie regions trees are found only along the banks of streams or around lakes. In the western part of the province, however, belts of timber land varying from a

OUTLINE MAP OF MANITOBA
Showing the boundaries of the province, navigable rivers, lakes, principal cities, and the highest point of land.

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few hundred yards to ten miles in width are met. These belts contain elm, oak, the ash-leaved maple and the aspen or poplar, and some spruce. In the spring the unbroken prairies are covered with wild flowers, and in most places trees and shrubs grow readily about the home.

In the northern part of the province fur-bearing animals are abundant, and the hunter and trapper receives good remuneration for his time and skill. Minks, muskrats and martens are caught in large numbers. Moose, deer, elk and reindeer or caribou are found in the unsettled regions, and during the summer duck, grouse, plover and woodcock are numerous. Many migratory birds following the Mississippi pass by the Red River and Lake Winnipeg to their northern breeding grounds.

Minerals and Mining. Deposits of iron ore are found on the shore of Lake Winnipeg, and soft coal is found in the southwestern part of the province, but neither is extensively mined. There is an abundance of limestone for building purposes, beds of clay suitable for making brick of excellent quality occur in several parts of the province, and north of Lake Saint Martin are deposits of gypsum which furnish raw material for the manufacture of wall plaster and plaster of Paris. One-third of the gypsum produced in the Dominion is taken from these beds.

Fisheries. The lakes and the shore waters of Hudson Bay abound in fish; large quantities of whitefish, pickerel, pike and trout are taken. The annual catch amounts to about $850,000, much of which is shipped to Chicago. The industry gives employment to about 2,000 people.

Forests and Lumbering. In the southwestern part of Manitoba are a number of hill districts which are forested. Some of these have been set aside as government forest reserves. They are known respectively as Turtle Mountain Reserve, 70,000 acres; Spruce Woods Reserve, 143,700 acres; Porcupine Reserve, 759,000 acres, and Duck Mountain Reserve, 988,000 acres. The chief lumbering operations are carried on in the spruce forest belt north of the prairie region. Timber is cut only under government supervision. Most of the lumber manufactured is used in the province.

Agriculture. Agriculture is the chief industry of the province. The soil over a great portion of the prairie region is unusually deep and fertile, that of the Red River Valley being of unusual fertility. Both the soil and climate of this region are especially adapted to raising spring wheat of the highest quality, and *Manitoba hard* has become the world's standard for the highest grade of wheat. The production of this cereal is the chief agricultural interest. The other leading grain crops are oats, barley and rye. Some flax is raised, but grain crops are usually more profitable. Potatoes yield from 200 to 400 bushels per acre, and the annual crop is about 7,750,000 bushels. Roots and vegetables are grown everywhere for home consumption. Alfalfa, timothy and corn are extensively grown for fodder.

Live stock is receiving increased attention and dairying is profitable, the annual output of dairy products exceeding $3,800,000. Excellent breeds of horses, cattle, sheep and swine are found on most of the farms, and poultry is a valuable source of income. Beekeeping is increasing in importance and over 100,000 pounds of honey are marketed each year.

Manufactures. The manufactures are limited, and they are connected chiefly with the agricultural interests, with railway repairs and lumbering. Flour mills are found in the larger towns, and flour leads in the manufactured products. Lumber and lumber products and foundry and machine-shop products follow. Some agricultural implements are made, but most of the machinery, agricultural implements, hardware and textiles are imported. The rivers furnish abundant water power and eventually most of it will be used for operating mills, factories and electric plants.

Transportation and Commerce. The southern part of Manitoba is better supplied with railroads than any other part of Canada. The Canadian Pacific, Canadian Northern and Grand Trunk Pacific traverse the province from east to west and connect Manitoba with the other provinces of the Dominion. Branches of the Canadian Pacific, Canadian Northern and the Great Northern make connections with the leading cities in the northern part of the United States and also make north and south connections between the most important cities in the province. A line is now building from Prince Albert, Saskatchewan, to Port Nelson on Hudson Bay. When completed this railway will open to settlement a large area in New Manitoba, and will connect the prairies, through Hudson Bay, with the markets of Europe. Winnipeg is one of the busiest railway centers in Canada and lines radiate from it in all directions. The more densely populated sections are well supplied with telegraph and telephone facilities.

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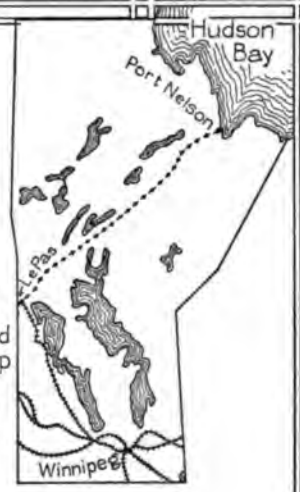
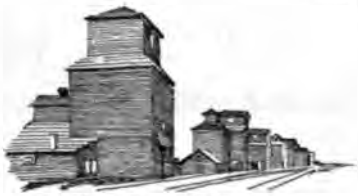
MANITOBA

Old and New Manitoba
■ Former Area
▨ Added Territory

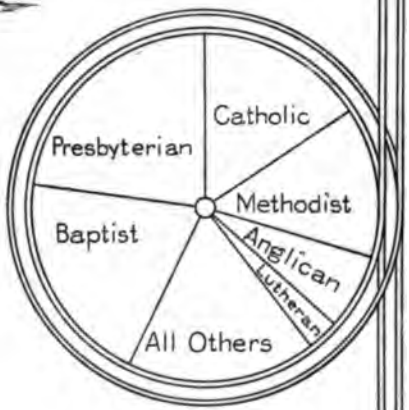
Fort Garry
The Beginning of Winnipeg



Railroad
Map



Elevators in the
Wheat Country



Religions

An Agricultural
Province

Coat of Arms

A Consolidated School

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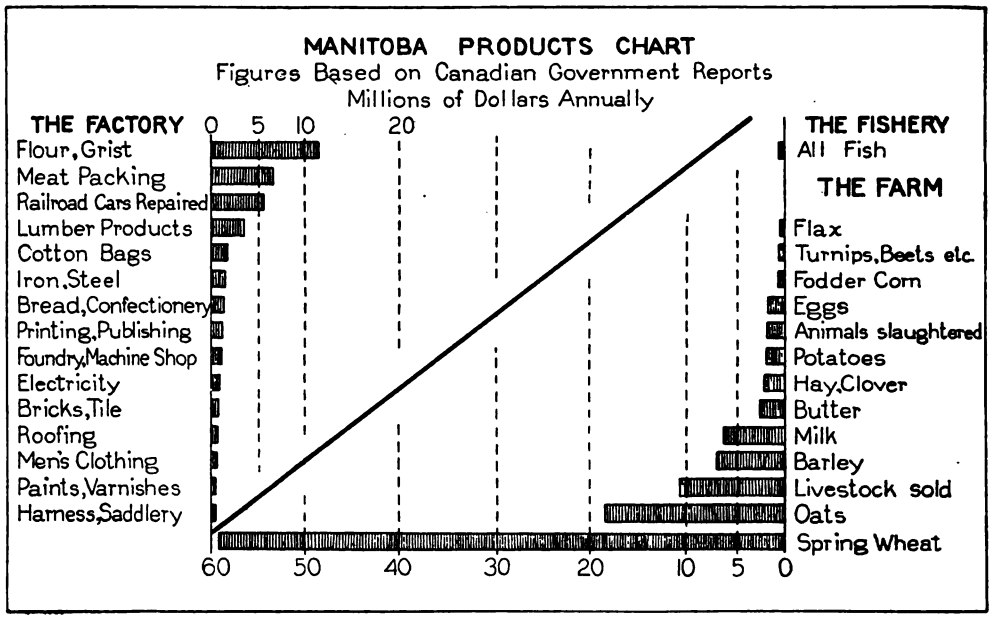

The chief exports consist of agricultural products, of which wheat is the most important. Some lumber is exported, but most of it is consumed at home. The imports consist of manufactured goods, especially textiles, machinery and hardware. Great Britain and the United States are the leading countries with which the province is engaged in foreign trade.

Education. Manitoba maintains an excellent school system. It was the first province to follow the example of the United States and to set aside two sections of land in every township as a grant for the maintenance of public schools. Elementary education is free and compulsory. The schools are maintained from public revenues, provincial and local. The elementary and secondary schools are under the control of a minister of education, who is a member of the executive council of the province. He is assisted by an advisory board composed of twelve members; some of these are elected by the teachers and others are appointed by the department of education. The elementary schools are undenominational in character, but religious instruction may be given after school hours.

The University of Manitoba, at Winnipeg, is at the head of the school system. It was established in 1877 and has affiliated with it several colleges maintained by various religious denominations, as well as public schools. The university has an endowment of 150,000 acres of land. University extension work is carried on throughout the province, and professors from the university give popular lectures on various subjects. Two normal schools are maintained by the provincial government, one at Winnipeg and the other at Brandon. The Winnipeg school aims to prepare teachers for schools in towns and in the country, while that at Brandon prepares teachers for rural schools only.

The Manitoba Agricultural College near Winnipeg, which is affiliated with the university, offers two strong courses, one in agriculture for young men and one in home economics for young women. These courses are so planned that students residing on farms may pursue their studies during the winter and work during the summer. There are also three-year courses for teachers of agriculture and home economics in high schools, and several high schools have classes in these branches.

Government. The executive power is vested in a lieutenant-governor, appointed by the Governor-General of Canada, and an executive council of seven members, responsible to the provincial legislature.

The legislature consists of one house of forty-two members elected for five years by registered manhood and woman suffrage. The province sends fifteen members to the Dominion House of Commons and four members to the Senate. The common law of England prevails in Manitoba, and English is the official language.

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RESEARCH QUESTIONS ON MANITOBA

(An Outline suitable for Manitoba will be found with the article "Province.")

For how many miles does this province border on the United States?

How much larger is Manitoba than it was in 1910?

How does the vegetation of the eastern and northern part of the province differ from that of the south?

In what way are the manufacturing interests connected with the natural resources of the province?

How will the province doubtless obtain its power for manufacturing in the future?

Who was the first white man to visit this region, and when did he come? Who was the first white man to build within the territory?

Who are the *métis?*

What interesting superstition is preserved in the name of the province?

What is there of special interest in the geographic situation of Manitoba?

What does the high latitude give to this province which compensates, in the view of the agriculturist, for the shortness of the summer season?

How does it happen, since the annual rainfall is less than eighteen inches, that there is sufficient for agriculture?

Why cannot an electric-light company or a telegraph or telephone company fix its rates to suit itself?

As the population has grown steadily since the last census was taken, in 1910, how does it happen that the average density of population is decidedly less than it was at that date?

What is still found in this region that was sought by the very earliest visitors?

What distinction has the southern part of the province in the matter of railroads?

Who were the first people who came into Manitoba with the intention of making it their permanent home?

Of what mineral substance does this province yield one-third of all that is produced in the Dominion?

With what two countries is most of the trade of Manitoba carried on?

When did this territory come into the possession of the Dominion government?

How many times as large as the original province is the present province?

What is the southern and central part of the province supposed to have been in past geologic ages?

How many people make their living at some phase of the fishing industry?

In what educational idea did Manitoba early follow the example of the United States?

How do you account for the fact that this province has been to a large extent the "storm center" of Canadian politics?

How has this affected the schools?

What has Manitoba done toward the preservation of its forests?

What is the difference in the aims of the two normal schools maintained by the province?

What is *Manitoba hard,* and how does it rank with other products of its class?

How does the provincial school system make special provision for the young men and women who live on farms?

Who was Louis Riel, and what did he attempt to do?

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At the head of the judicial system is the court of appeals, with a chief justice who ranks as the chief justice of Manitoba, and four associate judges; then comes the court of King's Bench, with a chief justice and five associate judges. Each district has the usual inferior courts.

For local administration the rural regions are organized into municipalities; denser centers of population are organized into villages, towns or cities, according to the number of inhabitants. These are administered by an elected council, called board of aldermen in the incorporated cities.

Public Utilities Commission. A public utilities commission was created in 1912 and placed in charge of the public utilities of the province. These include telegraph and telephone lines, companies furnishing to the public, either directly or indirectly, water, gas, heat, light, or power, and also such municipalities as shall properly consent to come within its authority. The commission has the power to regulate rates, value the property of public service corporations, control issues of stocks and bonds, and possesses the authority of a court of record. It can enforce its judgments, which are final, except as to the question of jurisdiction, from which an appeal can be taken. Municipal franchises are subject to the commission's approval. The commission is subject to the legislative authority of the province.

History. *Early Exploration.* The first white man to penetrate this region was the French explorer, Sieur de la Verendrye, who explored the neighborhood of Lake Winnipeg in 1733. Five years later he built Fort Rouge, on the site of the present city of Winnipeg. French and Scotch fur hunters and traders began now to visit this region. By their marriage with Indian women a race of half-breeds or *métis* sprang up. After the conquest of Canada by the British in 1763 the fur trade, mostly in the hands of the Hudson's Bay Company, became more active.

The Red River Settlement. Between 1811 and 1817 the Earl of Selkirk made the first attempt permanently to settle this region. He brought a number of Scottish peasants and began to colonize the fertile regions along the banks of the Red River. The colony became known as the Red River Settlement. After the initial difficulties had been overcome the settlement prospered, but still the region remained for the following fifty years almost exclusively in the hands of the fur traders.

Manitoba Made a Province. In 1869 the rights of the Hudson's Bay Company over the northwestern territory were transferred to the newly-founded Dominion of Canada. In 1870 the Red River Settlement was organized into a province and under the name of Manitoba was admitted as the fifth province of the Dominion. The area of the new province was 13,500 square miles and it had a population of about 12,000 inhabitants, largely half-breeds. The French section of these, fearing that their privileges would be abolished, rose in rebellion under the leadership of Louis Riel, but upon the arrival of a British force under General Wolseley, Riel fled and the rebellion collapsed. In 1881 the area of the province was enlarged to 73,732 square miles and in 1912 it was again enlarged to its present size.

The School Question. On account of its situation as the Key to the western provinces, and owing to the fact that its inhabitants belong to many races and to different religious denominations, Manitoba has been the storm center of Canadian politics. One of the most troublesome problems was that relating to religious teaching and to the language of instruction in elementary schools. In 1890 the system of separate religious or parochial elementary schools was abolished and the present system of undenominational schools was established. This measure greatly dissatisfied both the French and Catholic inhabitants not only in the province but in the whole of Canada. After a long agitation a settlement was effected in 1896 by which religious instruction could be given in schools, after school hours.

Other Political Problems. The rapid economic development of the province has given rise to many political and economic questions, such as curbing the monopolistic power of railroads or other big corporations and problems of a similar kind, which have agitated the province and spread to other provinces of Canada. In 1908 the government bought up the telephone system of the province. In 1910 a workmen's compensation act was passed. In 1916 stringent legislation was adopted permitting only the use of English in the public schools. In the same year a strict prohibitory liquor act was passed, and the legislative suffrage was extended to women. In 1917 the university was made a provincial institution, its body of governors being all appointed by the provincial government.

The city of Winnipeg in 1916 had a population of 163,000 (with its suburbs, 200,000) and now ranks as the third city in the Dominion;

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it is at times spoken of as the coming "Chicago of the Canadian West." It is in harmony with the province in all progressive measures, and is the leader of Western Canada in social, moral and religious advancement. G.B.

Consult Adams' *Ten Thousand Miles Through Canada*; Legge's *Sunny Manitoba*; Bryce's *Manitoba*.

Related Subjects. The following articles will be helpful to the reader who is interested in Manitoba:

CITIES AND TOWNS

Brandon	Saint Boniface
Dauphin	Selkirk
Minnedosa	Souris
Morden	Stonewall
Neepawa	Winnipeg
Portage la Prairie	

HISTORY

Hudson's Bay Company	Riel, Louis

LAKES

Manitoba	Winnipegosis
Winnipeg	

LEADING PRODUCTS AND INDUSTRIES

Alfalfa	Flour
Clover	Fur and Fur Trade
Corn	Gypsum
Dairying	Potato
Fish	Wheat

RIVERS

Assiniboine	Nelson
Churchill	Red River of the North

MANITOBA LAKE, a lake in the south-central part of the province of Manitoba, about sixty miles west of Lake Winnipeg. It is about 135 miles long and twenty-five miles wide, and has an area of 1,817 square miles—nearly as great as that of Prince Edward Island and 600 square miles larger than that of the state of Rhode Island. Its surface level is forty feet higher than Lake Winnipeg, into which it discharges through the Dauphin River. It is navigable for vessels drawing ten feet of water, but carries little traffic. It abounds in fish, but its fisheries are of little commercial importance in comparison with those of Lake Winnipeg. Moose, elk, deer and wild fowl frequent its shores and are an attraction for sportsmen.

MANITOU, or **MANITO,** *man i too'*, an Algonquin Indian word, meaning *mystery* or *supernatural*. The name was given by certain tribes of North American Indians to the spirit of good or evil which was supposed to become the guardian angel of each individual. The manitou is usually represented as an animal and is assigned to an Indian in his dreams during his first religious fast. The animal then becomes his personal fetish (which see); he carries its skin as a charm, and pictures of the animal are tattooed or painted on his body and are engraved on his weapons.

MANITOULIN, *man i too' lin*, **ISLANDS,** a group of islands lying in Lake Huron, separating Georgian Bay from the lake proper. They are set apart from the mainland, the north shore of Lake Huron, by a strait seven to

LOCATION MAP

The large area in black is the chief island of the group, itself called Manitoulin, or Great Manitoulin.

eighteen miles wide, called the North Channel. The islands are irregular in their shape and surface, the larger ones being covered with dense growths of pine. Fishing, sailing and bathing are excellent, and everywhere are hotels and summer homes built to take advantage of these opportunities. About half of the 2,000 people comprising the resident population are Ojibway Indians.

The Manitoulins (meaning *sacred isles*) include dozens of islands. Most of them are in Ontario, including Great Manitoulin, or Manitoulin, and Little Manitoulin, or Cockburn Island. The former, sometimes also known as Sacred Isle, is ninety miles long and from five to thirty miles wide. Cockburn Island is nearly circular in shape, and has a diameter of about seven miles. Drummond Island, the only important one belonging to Michigan, is twenty-four miles long and from two to twelve miles broad.

MANITOWOC, *man i toh wahk'*, Wis., the county seat of Manitowoc County, situated about midway between the northern and southern extremities of the state shore line, and at the point where the Manitowoc River discharges into Lake Michigan. Milwaukee is seventy-five miles south. Transportation is provided by the Chicago & North Western, the Minneapolis, Saint Paul & Sault Sainte Marie and the Pere Marquette railroads, the latter by ferry from Michigan, and there is steamer con-

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nection with all important lake ports. Manitowoc received its city charter in 1870. Germans and Poles represent the foreign element of the people; the population in 1910 was 13,027; in 1916 it was 13,805 (Federal estimate). The area of the city is nearly three square miles.

Manitowoc has a good harbor and fine shipping facilities, and sends out large quantities of grain, lumber and dairy products. Shipbuilding and ship repairing constitute the principal industries; there are, besides, large grain elevators, coal docks, salt houses, manufactories of furniture, and canning and cheese factories. Manitowoc has three parks. The Polish Orphan Home, the county insane asylum, Holy Family and Saint Mary's hospitals, Saint Felix Industrial and Reform School and Saint James Library are the noteworthy features of the city.

MANKA'TO, MINN., is the county seat of Blue Earth County, in the south-central part of the state. Saint Paul is eighty-five miles northeast; Sioux City is 183 miles southwest. Mankato is on the Minnesota River, just below the mouth of the Blue Earth River, and navigation is possible a part of the year. Built upon the side of the south bluff of the Minnesota River, the city is famed for the beauty of its site. It is served by the Chicago, Saint Paul, Minneapolis & Omaha; the Chicago & North Western; the Chicago, Milwaukee & Saint Paul, and the Chicago Great Western railroads. The area is nearly seven square miles. The population, which is fifty per cent German and Scandinavian, in 1910 was 10,365.

Mankato has a state normal school, a young ladies' seminary (Lutheran), Catholic Mother House and Seminary, and Immaculate and Saint Joseph's hospitals. The Federal building, county courthouse, Carnegie library and Y. M. C. A. building are prominent structures. Places of interest are Rapadan Dam, Minneopa State Park, containing Minneopa Falls, and Sibley Park, where, after an Indian uprising in 1862, thirty-eight Indians were hanged; about 300 others were condemned, but the sentence was commuted by President Lincoln. Near the city are several lakes which attract many summer visitors.

In the vicinity are large quarries of pinkish-buff limestone, the annual output of which is valued at $100,000. Cement works, a traction engine and trip-hammer factory, a creamery package factory, shirt and overall factory and a knitting mill are among the important manufacturing industries. Mankato ships quantities of grain and other agricultural produce. Near the city once stood a village of the Mankato tribe of Sioux Indians, for whom the town was named. It was settled in 1853 and chartered in 1868. In 1910 the commission form of government was adopted. E.F.S.

MANN, HORACE (1796-1859), one of the most famous educators the United States has produced. He was born at Franklin, Mass., graduated in 1819 at Brown University, and after studying law at Litchfield, Conn., was in 1823 admitted to the bar. For ten years he practiced law at Delham, and during the latter half of that time was a member of the state legislature; in 1883 he was elected to the state senate, of which he became president in 1836. From the beginning of his public life he showed a great enthusiasm for philanthropy and for educational reform, and this continued throughout his life, often at the cost of his own financial interests.

HORACE MANN
He laid the foundation for America's common school system and organized the first normal school.

When, in 1837, a board of education was appointed to remodel the school system of Massachusetts, Mann was made its secretary. He gave up his law practice and his political aspirations, and devoted all his time and energy to establishing reforms. Many of his measures met with violent disapproval, but he persisted, and in time not only Massachusetts, but practically every state in the American Union profited by his work. Indeed, he may be looked upon as practically the founder of the common school system. At his own expense he visited Europe in 1843, and embodied in his *Reports* the results of his study of educational methods there. He also founded at Lexington, Mass., in 1839, the first training school for teachers in the United States.

In 1848 he was elected to Congress, where he remained until 1853, energetically opposing slavery. From 1852 until his death he was president of Antioch College, at Yellow Springs, Ohio, and in that position made his influence felt in the movement for equal educational opportunities for men and women. Greater than any

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specific thing which he accomplished was his success in stirring up a general interest in educational affairs. He wrote *Lectures on Education, Letters and Speeches on Slavery* and twelve annual *Reports* which are regarded as among the classics of educational literature.

Consult the *Biography of Horace Mann*, by his wife, Mary Peabody Mann; Hinsdale's *Horace Mann and the Common School Revival in the United States.*

MANNA, *man'a,* the food provided for the Children of Israel during their forty years of wandering in the Wilderness. It appeared as small, round flakes of a yellowish-white color, and tasted like wafers made with honey (*Exodus* XVI; *Numbers* XI). In *Exodus* XVI manna is said to have rained from heaven each morning. The daily portion of each person was about six pints, or an *omer,* and was gathered in the morning for the day. Gathering more than the day's allowance was forbidden, and manna gathered in defiance of the order soon decayed. On the sixth day, twice the usual amount fell, and two omers were gathered in preparation for the Sabbath. When the Children of Israel crossed the Jordan into Canaan, the fall of manna ceased. A substance like manna found on the camel's thorn, an Asiatic shrub, is sometimes called *Jews'* or *Hebrew manna.*

MANNERING, *man'er ing,* MARY (1876-), an English actress who has won the admiration of her audience because of personal charm and sweetness of voice. Until twenty years of age she acted principally in English provinces, having made her début with Mrs. Brown Potter and Kyrle Bellew in *Hero and Leander.* Then she was engaged by Daniel Frohman and introduced to American audiences. Her first American appearance was at Hartford, Conn., as Leonie in *The Courtship of Leonie.* She then dropped her family name of FLORENCE FRIEND, by which she had been known on the English stage, and assumed that of "Mary Mannering," the maiden name of her grandmother. Among the many plays in which she has acquired a high reputation are *Trelawney of the Wells, Janice Meredith, The Lady of Lyons, The Stubbornness of Geraldine, The Walls of Jericho, A Man's World* and *The Garden of Allah.* After her divorce from James K. Hackett, whom she had married in 1897, she became the wife of Frederick E. Wadsworth.

MARY MANNERING

MANNHEIM, *mahn'hime,* the chief town in the grand duchy of Baden, is situated on the right bank of the River Rhine, near its junction with the Neckar. The old fortifications have been converted into gardens, and the town is one of the cleanest in all Germany. The grand-ducal palace, which covers fifteen acres, and is the largest of its kind in the empire, contains a fine picture gallery and a library. The flourishing machine works of the city, which give employment to 10,000 persons, turn out great numbers of agricultural implements and gasoline and electric motors. A celluloid factory employs 2,000 workmen. Cigars, carpets, rubber, railway supplies, mattresses and leather goods are other products of manufacture. The great river trade of Mannheim has been stimulated by the construction of extensive docks and harbors. Population, 1911, 194,000.

MANNING, *man'ing,* HENRY EDWARD (1808-1892), a cardinal of the Roman Catholic Church, leader in Roman Catholic movements in England, and active worker for the betterment of the social life of the people, especially along temperance and educational lines. Cardinal Manning was born at Totteridge in Hertfordshire, England, was educated at Balliol College, Oxford, and later was made a Fellow of Merton. In 1851 he left the Church of England and joined the Church of Rome. His advancement in that communion was rapid from the first. He founded the congregation of the Oblates of Saint Charles Borromeo at Bayswater, London, was made archbishop of Westminster in 1865 and cardinal in 1875. Before his secession to Rome, he published several volumes of powerful sermons. Through his defining of Papal infallibility at the Vatican Council in 1870 he gained world-wide renown. He was a devout priest, a statesman always loyal to the Church, and a practical reformer.

MANSARD, *man'sahrd,* **ROOF,** a variety of curb-roof designed to replace the ordinary attic with a top story almost as spacious as that below. There are two slopes to the roof, the lower being but little inclined from the upright, and pierced with windows. The upper slope is variable in pitch, but more nearly flat than the

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ordinary curb-roof. Although first used in the Louvre by Pierre Lescot, about 1550, the Mansard took its name from François Mansart, the

MANSARD ROOF
With dormer window on side.

French architect who brought it into general favor.

MANS'FIELD, Richard (1857-1907), distinguished for his intellectual and spiritual interpretation of romantic and tragic rôles, was for years the leading actor on the American stage. He was born on Helgoland, now a German island fortress in the North Sea, and was the son of a London wine merchant and an opera singer. As a youth he studied painting at the South Kensington Art School, London, but was unable to continue his studies because of lack of funds. At the age of seventeen he emigrated to America and began work as a clerk in a Boston mercantile house. The following year Mansfield went to England, where he began his theatrical career by singing in Gilbert and Sullivan operas.

RICHARD MANSFIELD

Returning to America in 1878, he soon won success in the regular dramatic field, his first notable part being that of Baron Chevrial in *A Parisian Romance*. Later he attained wide fame through his portrayal of such rôles as Dr. Jekyll and Mr. Hyde, in the play adapted from Robert Louis Stevenson's famous novel, of Beau Brummell, of Arthur Dimmesdale, in his own adaptation of *The Scarlet Letter*, of Monsieur Beaucaire (from Booth Tarkington's novel), of Brutus in *Julius Caesar* and the leading part in Ibsen's *Peer Gynt*. Though Mansfield was sometimes criticized for various mannerisms and eccentricities, no one did more than he to uphold the dignity and high ideals of his profession.

MANSFIELD, Ohio, the county seat of Richland County, is in the north-central part of the state, fifty-five miles south and east of Sandusky and sixty-eight miles southeast of Toledo. It is on the Pennsylvania, the Baltimore & Ohio and the Erie railroads, and has several interurban electric lines. The population, which includes a number of Hungarians, Slavs, Greeks and Italians, in 1910 was 20,768; in 1916 it was 22,734 (Federal estimate).

Mansfield has an area of five square miles. It is well situated on a prominence 1,200 feet above sea level. Sherman-Heineman Park of 100 acres is a part of a chain of parks. There are many handsome private residences, a Federal building, a soldiers' and sailors' building, Carnegie Library, a cathedral (Roman Catholic), Y. M. C. A. building and a public emergency hospital; and here are located the county children's home, the county infirmary and the Ohio state reformatory.

The city is the distributing center for the surrounding country, a productive grain section. Two miles distant are coal fields. Mansfield is known for a great variety of manufactures, among which are sheet steel, automobile tires, rubber, stoves, farm implements, sawmills, threshers, chains, pumps, sanitary ware, ammunition and watchcases. The annual value of manufactured products exceeds $16,000,000.

Mansfield was organized in 1808, incorporated as a village in 1828 and became a city in 1857. It was named in honor of Jared Mansfield, a surveyor and West Point professor. The city was the home of John Sherman from 1840 until his death. C.S.W.

MANSLAUGHTER, *man'slaw ter,* the wrongful killing of another without malice, expressed or implied. It differs from murder in not proceeding from deliberate malice, or *malice prepense*. Manslaughter has been distinguished as *voluntary*, where the killing is intentional, but done in the heat of passion and without previous malice; and *involuntary*, the result of criminal carelessness, or occurring while the offender is engaged in some wrongful act. An example of voluntary manslaughter is the killing of a person in a quarrel; a reckless automobile driver who runs over and kills a pedestrian is guilty of involuntary manslaughter. The punishment for manslaughter is regulated

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by statute, and varies in different countries. Imprisonment for from one to fourteen years is the ordinary penalty for this form of crime, which ranks below the different degrees of murder. See HOMICIDE; MURDER; CRIME.

MAN'TELL, ROBERT BRUCE (1854-), theatrical manager and actor whose repertoire embraces over twenty plays of a classical and historical order. In Shakespearean rôles Mr. Mantell has been remarkably successful. He possesses personal magnetism, and his power upon his audiences is direct and convincing. He was born at Ayrshire, Scotland. When four years old his parents moved to Belfast, Ireland, where he grew to manhood. He made his first theatrical appearance at Rockdale, Lancashire, England, in 1874, and the following year sailed for America, in the hope of securing an engagement at the Boston Museum. Unsuccessful, he returned to England and for a long time was a member of Mme. Modjeska's company. Not until 1885 did he appear in New York, when he played the leading part in *Tangled Lives*. Other successful plays in which he has starred are *The Corsican Brothers* and *The Marble Heart*. His Shakespearean repertoire includes *Hamlet, Othello, Romeo and Juliet, Julius Caesar, King John, Richard III, King Lear* and *Macbeth*.

MAN'TIS, the popular name of an insect sometimes called the *praying insect,* or *praying mantis,* from its attitude when at rest, which is somewhat that of prayer. The structure of its front legs is remarkable; they are bent and admirably adapted for catching other insects, on which it lives. It inhabits the warmer countries. In form and color the mantis so closely resembles the trees and plants it frequents as almost to defy detection, and thus it easily catches its prey. A species found in the Southern United States is regarded with superstitution by the negroes, largely because of its grotesque appearance.

THE MANTIS

MANUAL, *man'u al,* **TRAINING.** The boy's manual training begins with the possession of his first jackknife. Shall he whittle aimlessly just to make chips, or shall he be so directed that his whittling will result in skill in the use of his knife and in the making of something useful? In the answer to this question we find the reason for the introduction of manual training into the public schools. *Manual training* is the term applied to all forms of construction work used as an agent in general education. In its broadest application the term includes all the construction work in the lower grades, but as ordinarily used it applies to the work of boys with tools in the grammar grades and the high school.

Much of the construction work required in connection with drawing in the lower grades forms an excellent preparation for real manual training lessons which begin in the sixth or seventh grade. The work for boys in the elementary schools consists in lessons in the thorough use and care of woodworking tools, exercises in carpentry and such lessons in mechanical drawing as may be necessary to enable the pupils to make drawings of the objects they are to construct. The girls take sewing and cooking.

High school courses include carpentry, machine work, forging, and, in some schools, founding. Schools offering these courses have well-equipped machine shops, blacksmith shops and laboratories for performing experiments in physics and chemistry. The work in mathematics is given a practical turn by application of the principles of algebra and geometry to the solution of problems arising in the manual training exercises, and a full course in mechan-

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ical drawing is required. Technical high schools are practically vocational schools in which students receive thorough industrial training.

Purpose. The first manual training school in America was opened in Saint Louis by Dr. Calvin A. Woodward as a department of Washington University. The work was so successful that similar schools were opened in other large cities. The purposes of the school opened in Saint Louis, as set forth by Dr. Woodward, were:

"(1) To furnish a broader and more appropriate foundation for higher technical education.

"(2) To serve as a developing school where pupils could discover their inborn aptitudes whether in the direction of literature, science, engineering or the practical arts.

"(3) To furnish those who look forward to industrial life opportunity to become familiar with tools, materials, the methods of construction and exact drawing, as well as with mathematics, elementary science and ordinary English branches."

In the grades manual training was for several years considered to be essentially a culture study. Its chief purpose was "to develop the child by developing the brain and increasing its control over materials through the hand and the eye." It trained the pupils in observation, strengthened the will and afforded opportunity for making practical applications of such studies as arithmetic and drawing. Manual training has always been regarded as a means of expression and this is perhaps the strongest claim that can be made for it as a culture study.

Be this as it may, from its introduction into the public schools of Boston in 1882, it was gradually extended over the country, and at the beginning of the twentieth century there was scarcely a city of 8,000 or more inhabitants that did not include manual training in its course of study. Practically the same courses were found in all schools. Since these courses were based upon the needs of cities they were not well suited to the smaller towns or to rural schools, and the work was not encouraged in these places.

Recent Changes. The rapid development of American industries and the consequent growth of cities are making necessary radical changes in both the courses of study and methods of instruction in the public schools, and since 1910 vocational training, or pre-vocational training, has been emphasized more than manual training, though by some educators the same meaning is applied to both terms. The chief difference between vocational and manual training lies in the end sought. Vocational training has for its purpose the fitting of the pupil for entering upon an occupation, while manual training seeks the complete development of the pupil without special regard to the occupation he may choose. Vocational training would train a boy to make boxes, that he might earn his living by making boxes. Manual training would use box making as a means of giving the boy a knowledge of the material used and skill in the use of the tools employed.

The value of manual training in rural and consolidated schools, provided the course is adapted to the needs of the boy on the farm, is almost beyond estimate. He finds he must know how to use many tools and to acquire sufficient skill in their use to enable him to repair his tools and implements, mend his harness and cut and solder sheet metal. W.F.R.

Related Subjects. The reader of this discussion of manual training is referred to the following articles for related information:

Carpentry	Industrial School
Domestic Art	School Garden
Gardening	Sloyd
Gary School System	Technical and Industrial Education
Household Arts in Education	Vocational Training
Industrial Art	

MANURES, *ma nures'*. When plants grow they obtain their food partly from the air and partly from the soil. The soil constitutes a receptacle for the materials plants require for their growth. Every plant is its own chemist and can be trusted to take care of itself, if the necessary materials, in a suitable condition to serve as food, are placed within its reach. But the materials thus extracted by the plant from the soil ought to be replaced, for otherwise the soil will lose its fertility and become incapable of producing any more crops. Any substance which is applied to the soil in order to restore or increase its fertility is technically a *manure*.

Farm, or *Barnyard, Manure.* Manures are divided into *natural manures,* and *fertilizers,* or commercial manures. In this article it is intended to deal with natural manures as distinct from fertilizers, which are treated elsewhere in these volumes (see FERTILIZER). In the latter article a great deal of information about the requirements of growing plants, and the best kind of manures suitable to the nature of the various soils and of the various crops, is given.

Its Value in Agriculture. The most important of the natural manures is farm, or barnyard, manure; this means the excrements of farm animals. Farm manure contains all the

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elements which the plant requires for its growth, namely nitrogen, phosphoric acid and potash. But farm manure not only enriches the soil with these elements, but it also improves the mechanical condition of the soil; it makes it warmer, and enables it to absorb and retain more moisture. As farm manure contains a great percentage of organic matter it also helps to make the materials already existing in the soil more available as food for the plant. In fact, this service of improving the quality of the soil is sometimes far greater than that derived from the plant food it supplies. The neglect in preserving and properly using farm manures has been a great drain on the natural resources of the soil.

The quality of the barnyard manure depends upon the kind and age of the animals producing it, the quantity and the quality of the food they have and the nature and amount of the litter added. Its value also depends greatly upon the care taken for its preservation, especially of the liquid part of it. It is well to remember that five-eighths of the plant food which the manure supplies is found in the liquid portion. Farm manure ought to be kept under cover so that it will be protected from air and rain, otherwise it will lose much of its valuable elements by fermentation or by being washed away by the rain.

Properly-handled farm manure is by all means the best remedy for poverty of soil. Very few farmers handle manure so as to get even as much as half the possible value from it. There is probably no greater waste in the world than in connection with the handling of farm manure by the average farmer.

The average mixed farm manure contains approximately about 0.50 per cent nitrogen, 0.40 per cent potash and 0.30 per cent phosphoric acid. This means that a ton of farm manure contains ten pounds of nitrogen, eight pounds of potash and nearly seven pounds of phosphoric acid. It has been found in practice that the best way to utilize farm manure is to mix it with commercial fertilizers, after a careful study has been made of the requirement of the crops to be grown and of the character of the soil.

Farm manure usually gives the best results when spread evenly over the surface and plowed under or harrowed in. Fresh farm manure, being rich in nitrogen, has a forcing effect and tends to produce stems and leaves at the expense of fruit and grain. It is therefore better suited to use for market garden products, grasses and forage plants than for grain crops; for the latter only well-rotted manure ought to be used.

Green Manures. Another important class of natural fertilizers includes the green manures, that is, crops that are grown for the purpose of being plowed under while they are green in order to increase the stock of nitrogen in the soil. The most valuable crops in this respect are the leguminous (pod-bearing) plants, such as clovers, peas, beans, and so on, while rye is also used to some extent for that purpose. See GUANO. O.B.

Consult Thorne's *Farm Manures;* Van Slyke's *Fertilizers and Crops;* Wheeler's *Manures and Fertilizers.*

MANUSCRIPTS, *man'uskripts,* the name given to compositions written with the hand, as distinguished from printed works. In its commonest sense, the word refers not to inscriptions on stone or on clay, but to writings on

HEBREW BOOK OF THE LAW

some flexible material, such as the ancient papyrus or parchment and the modern paper. Other materials have been used at certain times and for special purposes, among them the leaves and bark of trees, linen and the skins of animals, but the "ancient manuscripts" of the classic and medieval ages, to which the term

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has come to be applied in an almost technical sense, were almost exclusively on papyrus, parchment or paper. Black ink, made of lampblack, boneblack or some vegetables substances, was most used, but red, purple and even yellow inks were sometimes employed for decorative purposes.

The earliest form of manuscript was the roll, or *volumen,* which was also called *biblos,* from the Greek name for papyrus. Sheets of papyrus or of parchment were joined together to make a long strip, the joining being so expertly done that there was no obstacle to the pen. Often a number of rolls were needed for a single work, as very large rolls were unwieldy. Beginning at the left, the work was written in columns of from two to three and one-half inches in width, the lines running parallel with the length of the strip. In rolling the finished work onto its central stick, the last part was of course rolled on first, so that the manuscript might be read as it was unrolled. After it had been read, it had to be rolled back again, that it might be in shape for the next reading.

As long as rolls were used, the manuscript was written on one side only, for a roll written on both sides would have been very inconvenient. The papyrus, moreover, was smoother on one side than on the other. When parchment, or vellum, came into use, its durable quality suggested the possibility of using both sides, and a more suitable book form was sought. The little waxen tablets, two or three of which were hinged together into something approaching in form the modern book, served as a model for the codex, or stitched volume. By the fourth century the codex, which had recommended itself by its greater convenience for reference, had almost displaced the roll for ordinary works, though the latter was still used for legal documents, records and liturgies. For such purposes it is in occasional use even to-day.

As a writing implement, the first in use was a reed softened at the tip and used as a brush for tracing the letters. The later Greeks and Romans used reeds also, but they pointed and slit them, so that they closely resembled the modern pen; and bronze pens were common in the days of the Roman empire.

Illumination of Manuscripts. The illumination of manuscripts is almost as old as the earliest making of them. Strictly speaking, the term applies only to the decoration of the text with gold, silver and brilliant colors, but it is commonly used to denote any ornamentation. The oldest-known manuscript with decorations in color is a papyrus roll of the ***Egyptian Book of the Dead,*** which dates from the fifteenth century B. C., but the brilliantly-colored pictures are in the nature of illustrations rather than of pure ornamentation. Among the Greeks and Romans, illumination of manuscript seems not to have become common until about the fourth

MANUSCRIPT COVER
A heavily-jeweled cover lovingly wrought over twelve hundred years ago.

century. From that time on, the various styles begin to be evident. There were illustrations of scenes described in the text; there were decorative borders, initial letters, vignettes and tailpieces, many of them done in gold and gorgeous colors. Copies of the Bible, in particular, were abundantly supplied with such ornamentation, and some manuscripts were of great beauty. When printing was introduced, the art began to wane. The early printed books, however, often had spaces left for the huge initial letters which had become common in the manuscripts, and these were introduced by hand. Very high prices have been paid for copies of the old illuminated manuscripts. A. MC C.

MAN WITHOUT A COUNTRY, THE. See subhead under HALE, EDWARD EVERETT.

MAORI, *mah o'ri,* the name of the native inhabitants of the two islands of New Zealand; the word *maori,* in their language, means ***native.*** They are above the average in stature, brown

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in color, and have thick, crisp (but not woolly) black hair. The Maoris, in point of physical development, are among the strongest races known. They ornament themselves by tattooing their faces with fantastic figures, a practice which gives them a wild appearance and makes their faces from a distance appear blue. At one time the Maoris were one of the fiercest cannibal tribes of the South Pacific, and waged many bloody wars with the white people, but since the English seized New Zealand they have greatly altered by contact with civilization, and very little remains of their primitive conditions. Their clothing is much the same as that of the white residents of the islands; they have embraced the Christian religion, and are industrious, intelligent people.

See the full-page drawing accompanying the article NEW ZEALAND, for the life habits of the Maoris.

MAP, a picture or diagram that shows the position of places on earth, or of stars in the heavens. If a photograph of the earth's surface were taken from an aeroplane in flight one kind of a map would be secured, but it would show many details which must be left off a practical map, for there must be room for printed names of the principal places. On the other hand the photograph map would not show man-made boundaries, and if it included much of the earth's surface it would not show railroads and rivers, which are small but often very important.

The purpose of a map determines the kind and amount of details which are shown. The usual map shows political divisions (countries, states or provinces, counties), cities, mountains, rivers, lakes, coast lines, railroads or principal trade routes. The map of a city shows all its streets. A chart, or sailors' map, tells the location of shoals and other places of danger to ships. A statistical map gives the relative importance of places in any one particular (for an example see map of alfalfa production in the article ALFALFA). Maps are also made to indicate historical changes (see map showing territorial acquisitions in the article UNITED STATES; also various maps indicating changed political divisions, such as ALBERTA, page 153).

Contour and Relief Maps. Contour and relief maps show the height of the places which they locate. One style of contour map draws lines through points at an equal distance above or below the sea level. Sometimes colors are used to emphasize the differences, blue for the ocean, green for lowlands, brown for mountains. The deepest shades mark the highest and deepest parts. (Contour maps will be found in the articles ASIA, AFRICA, EUROPE, NORTH AMERICA and SOUTH AMERICA.) A relief map is not a drawing but a model in cement or some other hard material to imitate the elevations and depressions of land. It cannot, however, represent accurately the steepness of slopes. Suppose, for instance, a relief map of India were made the length and breadth of this page. If it were correct in its proportions Mount Everest, the tallest peak in the world, would be only twenty-five one-thousandths of an inch high, and the map would not be a relief map after all. So in making it we should have to represent heights on a different scale than horizontal measurements.

History. Maps were probably made before writing of any sort was known, for savages sometimes direct explorers by drawing diagrams on the ground with a stick. A map in the British Museum, made on clay, is over 4,000 years old. Ptolemy, who lived in the second century, drew better maps than any known till after Columbus discovered America (1492). In the sixteenth century a man in Flanders called Mercator (which is Latin for Kremer, his real name, and means *merchant*) corrected and improved Ptolemy's work. As methods of measuring *latitude* and *longitude* (which see) improved, much more accurate maps were drawn. The first globe was perhaps made by Thales of Miletus, in the sixth century B. C., but after the decline of Greek learning the earth was believed flat till Columbus' discoveries.

No flat map can accurately represent the surface of the globe. On a map of the world made according to *Mercator's Projection* (see map OCEAN CURRENTS), on which all points in the same longitude are in the same vertical line, North America appears very much larger than South America because the one is broadest near the pole, where East and West distances are exaggerated by this plan, and the other is broadest near the equator. The custom of representing North by the top of the map, South by the bottom, East by the right side and West by the left side is copied from Ptolemy. Until recently maps were drawn with an inch or other unit of measure representing a certain number of miles; now they are generally made so that any measurement stands for a definite number of times its own length; for example, a million. The colored maps in this set of books representing the continents of North and South America, Europe, etc., are drawn to the scale

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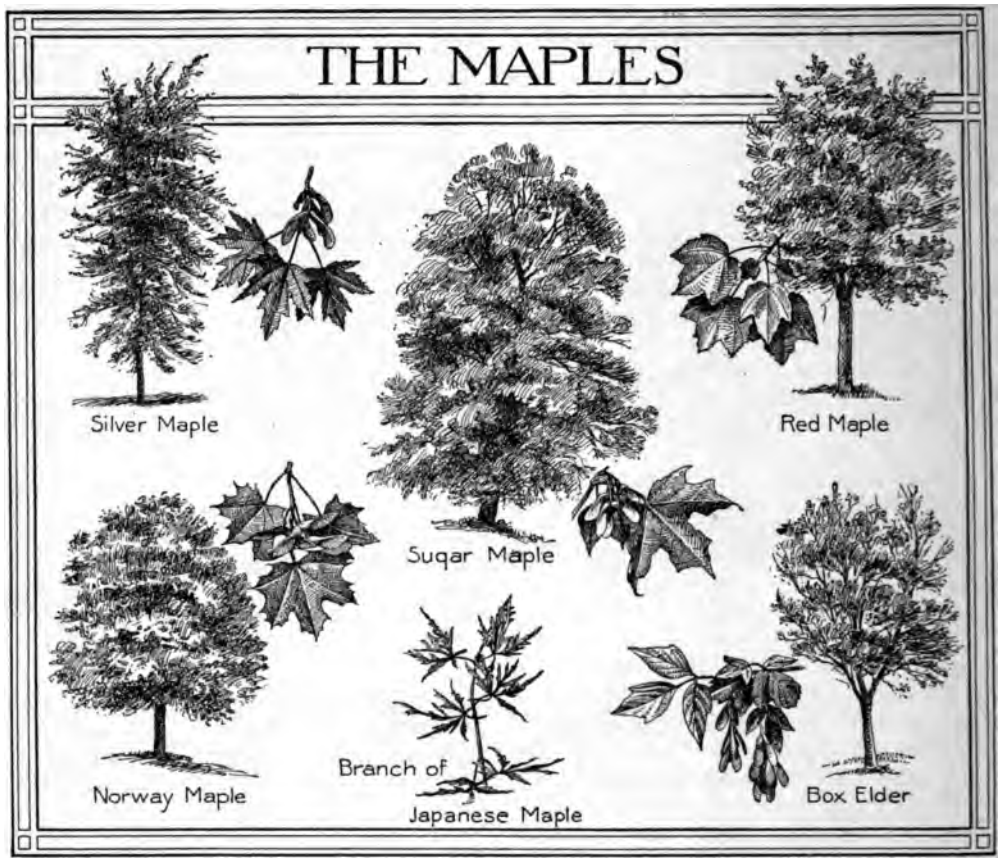

of 1 to 9,000,000, or, in other words, about 150 miles to 1 inch. C.H.H.

Consult Dickson's *Maps: How They Are Made and How to Read Them.*

MAPLE, *ma'p'l,* a family of handsome and valuable trees, probably represented in some manufactured form in every house in America. Nearly a hundred species are known, distributed throughout the northern and temperate regions of the world. Species of maple furnish most of the welcome shade along streets, and their beautiful foliage, fragrant, nectar-filled flowers and strangely-winged seeds are sources of constant pleasure.

All maples have opposite leaves (see LEAVES); they are broad and flat, with handlike veins and fingers, or lobes, numbering from three to seven, and their long-winged seeds in pairs. When growing in the open, all have full, well-rounded tops.

American Species and Uses. Leading all maples is the upright, gray-barked *sugar, rock* or *hard maple,* found from the Great Lakes to Newfoundland, south to Florida and west to Nebraska and Texas. It grows from seventy-five to 120 feet high and bears dark green leaves, which turn yellow, orange and red in autumn. The sugar maple leaf is the emblem of Canada. It is this handsome tree whose sugary sap is the source of the delicious golden-brown maple syrup which is so palatable on the breakfast table. Sugar manufactured from the sap is a commercially important article, particularly in Vermont, Northern New York and Canada. The tapping of maple trees and the "sugaring off" are outdoor tasks holding such keen delight and interest that an account of the process is given in Charles Dudley Warner's story, *Being a Boy.*

As a lumber tree, this species outranks all other maples. Its wood is heavy, hard and strong and takes a fine polish. Its color is light brown, tinged with red. Ever since colonial times it has been put to uncounted uses. Maple has been used for furniture ever since furniture was made in America. The knotted parts of sugar maple furnish the much-prized *bird's-eye* and *curled maples* of cabinetmakers. Hard

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maple is widely used for flooring. Saddles, boats, shoe lasts and wooden kitchen ware are made of hard maple, and it is used for bicycle rims, various parts of automobiles, and parts of many musical instruments. In the manufacture of agricultural implements sugar maple holds an important place, heading the list of woods used for that purpose in many great manufacturing centers. It is widely used as fuel, and as a producer of ashes for fertilizer and other purposes sugar maple stands first. About 1,167,000,000 board feet of maple are cut in the United States yearly and most of that is from the sugar maple.

Other American species are the *black maple,* also a sugar producer; the widely-grown *silver maple,* beautifully clothed in shimmering silver and green, a quick-growing, hardy tree, but with light, brittle wood; the *broadleaf,* or *Oregon maple,* the most valuable hardwood of the Pacific coast; the small *striped, mountain* and *dwarf maples;* the *vine maple,* and that valuable ornamental and lumber tree, the *red,* or *swamp maple,* of which Lowell writes in his *An Indian Summer Reverie:*

> The maple swamps glow like a sunset sea,
> Each leaf a ripple with its separate flush.

In Canada, maples comprise thirty per cent of the trees furnished by the government to meet the lack of natural protection against wind and snow.

Foreign Maples. The *sycamore maple,* with thick sycamorelike leaves and wide-spreading branches, is the most important hardwood tree of Europe, and is planted in America to some extent. The *Norway maple,* a large tree with dense foliage, is popular in England and is extensively grown in middle-western America. Various species of low-growing, feathery leaved *Japanese maples* are widely used for ornament.

Maple Insects. All maples are frequently attacked by injurious insects. Some bore into the bark while others eat the leaves. Great damage is often done by the tent caterpillar, the sugar-maple borer, numerous scales and species of plant lice and galls. Various washes, when the leaves are off the trees, are effective cures for scales. Whitewashing the tree trunks several times a season will keep out the borers.

Related Subjects. The reader is referred to the following articles in these volumes:

Insecticides and Fungicides	**Maple Leaf, The**
Leaves	**Sugar**
	Tent Caterpillar

MAPLE CREEK, a town in Southwest Saskatchewan. It is on the main line of the Cana-

The Maple Leaf Forever

In days of yore, the hero Wolfe,
Britain's glory did maintain,
And planted firm Britannia's flag
On Canada's fair domain.
Here may it wave, our boast, our pride,
And join'd in love together,
The Thistle, Shamrock, Rose entwine
The Maple Leaf forever.

CHORUS.

The Maple Leaf, our emblem dear,
The Maple Leaf forever!
God save our King, and heaven bless
The Maple Leaf forever!

On many hard-fought battle fields
Our brave fathers, side by side,
For freedom, homes and loved ones dear,
Firmly stood and nobly died:
And those dear rights which they maintained,
We swear to yield them never,
We'll rally round the Union Jack,
The Maple Leaf forever!
Chorus.

In Autumn time our emblem dear
Dons its tints of crimson hue;
Our blood would dye a deeper red,
Shed, dear Canada, for you!
Ere sacred rights our fathers won
To foemen we deliver,
We'll fighting die—our battle cry,
"The Maple Leaf forever."
Chorus.

God bless our loved Canadian homes,
Our Dominion's vast domain:
May plenty ever be our lot,
And peace hold an endless reign;
Our Union, bound by ties of love,
That discord cannot sever,
And flourish green o'er Freedom's home,
The Maple Leaf forever!
Chorus.

On Merry England's far-famed land,
May kind heaven sweetly smile;
God bless old Scotland evermore,
And Ireland's emerald isle!
Then swell the song, both loud and long,
Till rocks and forests quiver;
God save our King and heaven bless
The Maple Leaf forever!
Chorus.

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dian Pacific Railway, eighty-five miles southwest of Swift Current and sixty-three miles east of Medicine Hat. Maple Creek is of importance as a distributing and shipping point for the surrounding mixed-farming district. It has large grain elevators, farm-implement warehouses and lumber yards, and its only manufacturing establishment is a flour mill. The town owns and operates its waterworks and sewerage system. The local post office, which cost $35,000, is the most striking building. Population in 1911, 936; in 1916, estimated, 2,000. W.J.R.

MAPLE LEAF, THE, the national song of Canada, celebrating the Dominion emblem, the leaf of the sugar maple. One who has visited the forests of Eastern Canada in the autumn and has seen them fairly ablaze with the red and gold of the frost-tinted leaves of this beautiful tree feels the fitness of this emblem. The song, while it celebrates the valor of the "brave fathers" of bygone days, is not purely a *Dominion* song, but rather an *Empire* song, for it "entwines" with the beloved maple leaf the rose of England, the thistle of Scotland and the shamrock of Ireland, and it closes with the invocation of a blessing on those far-away but closely-related lands. The words of the song appear on page 3643.

MARABOU, *mair'a boo,* a stork from which is obtained the marabou feathers that are used so much for muffs and scarfs and as trimming for hats and gowns. There are two species; the original marabou, a large, white stork with greenish-gray wings and a large pouch beneath its bill, is a native of Africa, where it lives on fish, the larger lizards and small mammals; the other species, the *argala,* or *adjutant bird,* is common in India, where it is called *the bird of blessing.* Both kinds have the soft, much-prized, downy feathers under wings and tail.

MARACAIBO, *mah rah ki'bo,* the principal seaport of Venezuela and the capital of the state of Zulia. It is situated on the western shore of a strait that connects Lake Maracaibo with an arm of the Caribbean Sea, the Gulf of Maracaibo. It has all the equipment of a modern progressive city, with fine public buildings and a university, and for a long time it was the literary center of Venezuela. At the present time it is the only port of entry for Western Venezuela and a section of Eastern Colombia, and it carries on a thriving export trade in coffee, cocoa, hides, sugar, dyewoods and quinine. Its estimated population is 55,000.

Lake Maracaibo, situated in the northwestern part of Venezuela, is connected with the gulf of the same name by a strait about fifty miles long. At the broadest part the lake is about eighty miles wide and in places reaches a depth of 500 feet, but owing to a sandbar at its entrance vessels drawing more than ten feet of water cannot enter.

MARAJO, *mah rah zho',* or **JOANNES,** *jo ah'neez,* a large island about 180 miles long and 150 miles wide, lying between the estuaries of the Amazon and Para rivers, and belonging to the state of Para, Brazil. It is so low and swampy that during the rainy season the greater part of it is flooded, but in the dry season much of it affords excellent pasturage. In the swampy forests there are dense groves of rubber trees. The island is sparsely inhabited, though there is a small settlement on the east side, called Sauré. Most of the inhabitants are herders and rubber hunters who visit the island during the dry season.

MARAT, *ma rah',* JEAN PAUL (1744-1793), the second of three men in succession who wrought the worst evils in the French Revolution, Danton being first and Robespierre third. He was born at Boudry, studied medicine in Bordeaux, then removed to Paris and won fame as a court physician. After traveling extensively in Europe, he practiced medicine in London and published a number of scientific works. In 1789 he established a journal in Paris called *Le Publiciste Parisien,* which became the organ of the irresponsible element of the French capital. From this time he dropped all scientific study and identified himself with the Revolution. He called himself the friend of the people, and was always urging death upon the guillotine for opponents of his policy, at one time demanding 270,000 heads.

In 1792 he became a member of the Commune, and through his journal he instigated an insurrection, claiming that "no poverty, no misery or persecution could keep him quiet." He was brought before the Revolutionary Tribunal in April, 1793, but was acquitted of the charge of sedition and became even more powerful. His wickedness so stirred the heart of a girl named Charlotte Corday that on July 13, 1793, she slew him with a dagger, and for her act suffered death on the guillotine. See CORDAY D'ARMONT, MARIE ANNE CHARLOTTE; FRENCH REVOLUTION.

MARATHON, *mair'a thon,* a plain in Greece, on which was fought one of the decisive battles in the world's history. It is about twenty miles from Athens, and it was the Athenians, with their allies, the Plataeans, who, in 490 B.C., de-

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feated the army of the Persian king Darius. Miltiades, the Athenian general, had under his command about 10,000 men, while the Persians numbered almost 100,000, according to the ancient traditions; at the close of the sharp struggle 6,400 Persians lay dead on the field, while the Greeks had lost but 192. These were buried on the plain, under a mound which may still be seen. When the Persians had fled in terror to their ships, Miltiades chose his swiftest runner, Pheidippides, and dispatched him to carry the news to Athens. Stumbling, panting after his long run he entered the city, gasped out "Rejoice, we conquer!" and fell dead. See FIFTEEN DECISIVE BATTLES.

Centuries later the poet Byron, who had a strong passion for Greek liberty, wrote in his *Don Juan:*

> The mountains look on Marathon
> And Marathon looks on the sea;
> And musing there an hour alone
> I dreamed that Greece might still be free.

MARBLE, *mahr'b'l.* The ancient Greeks became very skilful in carving stone for ornamenting their buildings, and in making statues of the gods and of their heroes. So well was this work done that specimens of old Greek sculpture and architecture are held to-day as models of perfection. They used for this purpose a beautiful white stone, which we know as *marble.* Marble is limestone which has been purified and crystallized by heat *(metamorphism).* The crystals are so small that we cannot see them without a magnifying glass, but so numerous that they give the stone its beautiful appearance when it is polished.

Pure marble is perfectly white; but much of it has been colored by the presence of other minerals, so it is found in almost all colors from white to black. This variation in color is an advantage, since it adapts marble to a great variety of uses. *Pure* marbles are those that are of one color throughout; *variegated* marbles are mottled—that is, they have two or more colors. Some marbles are composed almost entirely of the shells or skeletons of minute animals, and they are known as *fossiliferous* marbles, or marbles composed largely of fossils. *Statuary* marble is pure white, of fine grain and even texture.

Marble is a stone of medium hardness and is easily worked. It takes a high polish, and when protected from the weather is durable. It is highly prized for ornamental work, for finishing interiors of hotels and other large buildings and for stairways. Formerly it was extensively used for headstones, but it has been largely replaced by granite, which is more durable.

The greater part of the marble used in the world is quarried in the United States. The most extensive quarries are in Rutland County, Vermont; others of importance are found in Georgia and Tennessee. It is also quarried to some extent in Colorado, Arizona, California and Alaska. The celebrated Carrara marble comes from Carrara, Italy. Parian marble, so highly prized by the Greeks, was obtained on the Island of Paros, in the Mediterranean Sea. Marbles of a variety of colors are found in Belgium, and a marble of brilliant red color is found on the French side of the Pyrenees Mountains.

Some of the quarries at Rutland, Vermont, are nearly 500 feet deep. All the work of quarrying and shaping the stone is done by machinery, and the greatest care is taken to prevent waste. In Italian quarries the old methods of hand labor and blasting, with their attendant waste, are still employed.

Consult Merrill's *Stones for Building and Decoration;* Renwick's *Marble and Marble Working.*

Related Subjects. The reader is referred to the following articles in these volumes:

Building Stone	Geology
Carrara Marble	Metamorphism
Fossil	Sculpture

MARBLES, little, many-hued, spherical balls of marble, agate, glass, baked clay and other materials, which have been playthings of children for many years. In America, the first day that brings the feel of spring and growing things brings also from the toy boxes those engrossing playthings of the schoolboy—the smooth and shining marbles. For a few weeks, wherever one may look, will be seen a ring of absorbed boys shooting marbles in the game of *little ring, big ring, lagging* or *tossing.* Then suddenly the marbles disappear completely for a year, to give way to the more exciting sports of summer.

Marbles range from one-third of an inch to two inches in diameter, and vary in price, according to size and material, from one cent for a dozen to as much as fifty cents for a single specimen. Bull's-eye and striped marbles are molded in clay, then baked, painted and glazed. Most of the ordinary marbles made in America come from an Ohio pottery, the natural onyx marbles being made in quantities at Akron. Nearly all agate marbles are made at Oberstein, Germany. Most of the common marbles used are manufactured in Saxony, and are made from limestone.

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MARCH CALENDAR

Birthdays

1. William Dean Howells, 1837.
   Augustus Saint Gaudens, 1848.
2. De Witt Clinton, 1769.
   Pope Leo XIII, 1810.
3. Alexander Graham Bell, 1847.
   James Lane Allen, 1848.
5. Elizabeth Barrett Browning, 1806.
6. Michelangelo, 1475.
   Philip H. Sheridan, 1831.
7. Luther Burbank, 1849.
8. Richard, Earl Howe, 1726.
9. Americus Vespucius, 1451.
10. Dudley Buck, 1839.
11. Torquato Tasso, 1544.
12. William Lyon Mackenzie, 1795.
    Sir John J. C. Abbott, 1821.
    Thomas B. Read, 1822.
13. Earl Grey, 1764.
14. Johann Strauss, 1804.
15. Andrew Jackson, 1767.
16. James Madison, 1751.
17. Roger B. Taney, 1777.*
18. John C. Calhoun, 1782.
    Grover Cleveland, 1837.
19. David Livingstone, 1813.
    William Jennings Bryan, 1860.
20. Charles N. Eliot, 1834.
21. Johann Sebastian Bach, 1685.
22. Anthony Van Dyck, 1599.
    Braxton Bragg, 1817.
    Rosa Bonheur, 1822.
23. Schuyler Colfax, 1823.
24. Egerton Ryerson, 1803.
25. Joachim Murat, 1771.
26. W. E. H. Lecky, 1838.
27. Louis XVII of France, 1785.
28. Raphael, 1483.
29. John Tyler, 1790.
30. John Fiske, 1842.
31. Franz Joseph Haydn, 1732.

Events

1. Jay Treaty ratified, 1796.
   Nebraska admitted to the Union, 1867.
   British blockade of German, Austrian and Turkish ports announced, 1915.
2. Missouri Compromise passed, 1820.
   Bitlis captured by Russians, 1916.
3. Florida became a state, 1845.
   Tax official shot in Manitoba by Louis Riel, 1870.
4. William Penn given grant of Pennsylvania, 1681.
   United States Constitution went into effect and Washington became first President, 1789.
   Vermont became a state, 1791.
5. The *Monitor* delivered to Federal government, 1862.
6. The massacre at the Alamo, 1836.
7. Providence, R. I., founded, 1638.
   New Brunswick refused to become a member of Canadian Confederation, 1865.
   Discovery of South Pole by Amundsen announced, 1912.
8. Germany declared war on Portugal, 1916.
9. Battle between *Merrimac* and *Monitor*, 1862.
10. Beginning of Battle of Neuve Chapelle, 1915.
11. Sir Alexander Mackenzie died, 1820.
12. Grant made commander of all Federal armies, 1864.
13. Alexander II of Russia assassinated, 1881.
14. Whitney's cotton-gin patented, 1794.
15. Julius Caesar assassinated, 44 B. C.
    Maine became a state, 1820.
    Troops called out by Canadian government to resist Fenians, 1866.
16. West Point Military Academy founded, 1802.
17. British evacuated Boston, 1776.
18. Bismarck resigned, 1890.
    One French and two English battleships sunk in Dardanelles, 1915.
19. Prussian Order of the Iron Cross instituted, 1813.
21. Robert F. Scott and companions died on return from South Pole, 1912.
22. Fortress of Przemysl captured by Russians, 1915.
23. Patrick Henry's famous oration delivered, 1775.
25. Slave trade abolished by British Parliament, 1807.
    Second rebellion under Louis Riel, 1885.
27. Oklahoma opened to settlers, 1889.
29. British North America Act passed by Parliament, 1867.
30. First meeting of Congress under new Constitution, 1789.
31. Last American troops left Cuba, 1909.

For Study

Bonheur, Rosa
Buds
Egg
Germination
Grafting
Grass
Kite
Mars
Michelangelo's *David*
Seed
Sistine Madonna
Wind

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MARCH QUOTATIONS

1. The stormy March is come at last,
With wind, and cloud, and changing skies;
I hear the rushing of the blast
That through the snowy valley flies.
—*Bryant.*

2. I, the invincible;
March, the earth-shaker;
March, the sea-lifter;
March, the sky-render. —*Crawford.*

3. There is a tide in the affairs of men,
Which, taken at the flood, leads on to fortune;
Omitted, all the voyage of their life
Is bound in shallows and in miseries.
—*Shakespeare.*

4. No matter what his rank or position may be, the lover of books is the richest and the happiest of the children of men.
—*Langford.*

5. And I smiled to think God's greatness flowed around our incompleteness,
Round our restlessness His rest.
—*E. B. Browning.*

6. Through the gaunt woods the winds are shrilling cold,
Down from the rifted rock the sunbeam pours
Over the cold gray slopes and stony moors. —*F. Tennyson.*

7. The wind bloweth where it listeth, and thou hearest the sound thereof, but canst not tell whence it cometh and whither it goeth. —*Bible.*

8. Many men owe the grandeur of their lives to their tremendous difficulties.
—*Spurgeon.*

9. He ate and drank the precious words,
His spirit grew robust;
He knew no more that he was poor,
Nor that his frame was dust.
He danced along the dingy days,
And this bequest of wings
Was but a book. What liberty
A loosened spirit brings!
—*Dickinson.*

10. Whenever the moon and stars are set,
Whenever the wind is high,
All night long in the dark and wet,
A man goes riding by. —*Stevenson.*

11. March! A cloudy stream is flowing,
And a hard, steel blast is blowing.
—*Barry Cornwall.*

12. If a book come from the heart, it will contrive to reach other hearts; all art and authorcraft are of small amount to that. —*Carlyle.*

13. Loud wind, strong wind, sweeping o'er the mountains,
Fresh wind, free wind, blowing from the sea,
Pour forth thy vials like streams from airy fountains,
Draughts of life to me. —*Mulock.*

14. . . . . Books, we know,
Are a substantial world, both pure and good. —*Wordsworth.*

15. Our Federal Union: it must be preserved. —*Jackson.*
The ides of March are come.
—*Shakespeare.*

16. Slayer of the winter, art thou here again?
O welcome, thou that bring'st the summer nigh! —*Morris.*

17. I hear the wind among the trees
Playing celestial symphonies;
I see the branches downward bent,
Like keys of some great instrument.
—*Longfellow.*

18. Honor lies in honest toil.
—*Cleveland.*

19. Ah, passing few are they who speak,
Wild, stormy month! in praise of thee;
Yet though thy winds are loud and bleak,
Thou art a welcome month to me.
—*Bryant.*

20. . . . . Daffodils,
That come before the swallow dares, and take
The winds of March with beauty.
—*Shakespeare.*

21. I wonder if the sap is stirring yet,
If wintry birds are dreaming of a mate,
If frozen snowdrops feel as yet the sun,
And crocus fires are kindling one by one. —*Rossetti.*

22. Up from the sea, the wild north wind is blowing
Under the sky's gray arch;
Smiling, I watch the shaken elm boughs, knowing
It is the wind of March. —*Whittier.*

23. The pleasant books, that silently among
Our household treasures take familiar places,
And are to us as if a living tongue
Spake from the printed leaves or pictured faces! —*Longfellow.*

24. Whirling the sands about his furious car,
March cometh from afar. —*Simms.*

25. *Impossible*—let me never hear that foolish word again. —*Mirabeau.*

26. Once more, and yet once more,
Returning as before,
We see the bloom of birth
Make young again the earth.—*Perry.*

27. Ah, March! we know thou art
Kind-hearted, spite of ugly looks and threats,
And, out of sight, art nursing April's violets! —*H. H. Jackson.*

28. He only is a well-made man who has a good determination. —*Emerson.*

29. O March that blusters and March that blows . . . .
Beauty you summon from winter's snows,
And you are the pathway that leads to the rose. —*Thaxter.*

30. It is nearly an axiom, that people will not be better than the books they read.
—*Potter.*

31. A small number of choice books are sufficient. —*Voltaire.*

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MARCH, the "windy month" that ushers in the spring. Its name, which has come down from ancient times, was given it in honor of the war-god Mars, but had no reference to the character of the month, for March in Italy is not the wild, blustering month that it is in more northerly latitudes. The vernal equinox, which marks the beginning of spring, falls on the twenty-first, and the month is thus partly winter and partly spring. In its character, too, it partakes of the traits of both seasons, for its cold and its storms are often broken in upon by days of real spring mildness and sunshine. The special gem of the month is the heliotrope or bloodstone, and the special flower, the violet, but in Canada and the northern part of the United States the violet does not come until after March is past.

History of the Month. In the modern year March is the third month, but in the early Roman calendar it was the first. When Julius Caesar made his reforms in chronology he made it the third month. Though it retained from that time the position he had given it in the calendar year, many of the European countries continued for centuries to regard it as the first of the legal year. England, for instance, did not begin to reckon its legal year from January until after the middle of the eighteenth century. March has had no such variations in length as have some of the other months, its thirty-one days having remained constant from the first.

Popular Sayings. There have been an unusual number of superstitions connected with March, quite without foundation. One, which is still quoted, concerns its weather. "If March comes in like a lion," the saying is, "it will go out like a lamb;" if, on the other hand, the first day of March is balmy and "lamblike," the last day is certain to be stormy. Another old saying declares that the three last days of the month are "borrowed" from April, while a third calls the first three days "blind days" and declares them to be unlucky. It is not so very long ago that farmers held so firmly to this belief that they would not plant seed on those days.

Special Days. There are no general holidays in March, but Texas celebrates the second day of the month as the anniversary of its independence from Mexico. March 4 of every fourth year is of special interest to the people of the United States as the inauguration day of the President.

MARCONI, *mahr ko'nce,* GUGLIELMO (1875-), an Italian electrician, famed as the inventor of one of the marvels of the modern age—practical wireless telegraphy. Through him thousands of lives and property of unknown value have been saved from destruction, for ships at sea, no matter how far from a friendly harbor, may now send news of danger or catastrophe and receive help from vessels within a radius of hundreds of miles. The discoverer of practical wireless telegraphy was born near Bologna, Italy, and was educated at Leghorn and at the University of Bologna. An an early age he showed deep interest in, and remarkable aptitude for, electrical science. When but twenty years of age he had made successful experiments in the transmission of messages by means of waves through earth and air. Then, as from time immemorial, the old adage, "A prophet is not without honor, save in his own country," held true. In spite of successful experiments made at Griffone

GUGLIELMO MARCONI
Through his inventive genius men may send messages 5,000 miles through the air, without wire, poles or other equipment between the terminals.

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in 1895, Marconi was unable to interest the Italian government in the wonderful invention his genius had developed. The following year he went to England, where he was well received, and his method was declared feasible, but the prophecy was made that it would never be practiced except for short distances and for limited use.

Then the Italian ministry of marine awoke to a realization of the value of his invention, and it undertook careful experimentation at Spezzia. In 1897 the Marconi Wireless Telegraph Company was founded. Four years later messages were being flashed several thousand miles, over land and sea. Through the use of wireless telegraphy daily newspapers with American and European news are issued on board transatlantic liners.

Marconi has received numerous medals and honorary appointments. In 1915 he became Senator of the Kingdom of Italy, and in June of the same year, when Italy entered the War of the Nations, he took charge of the wireless telegraph operations for his government. In June, 1917, in his capacity of captain in the Italian army, he visited the United States as a member of the Italian commission to confer on the war.

MARCO POLO, *mahr'ko po'lo.* See POLO, MARCO.

MARCUS AURELIUS, *mahr'kus aw re'li us.* See AURELIUS, MARCUS.

MARDI GRAS, *mahr de grah'*, or **SHROVE TUESDAY,** the last one of the days of revelry which are celebrated in Roman Catholic countries immediately before Lent. The name is a French expression meaning *fat Tuesday,* and refers to the French custom of leading a fat ox through the streets during the festival parade. Rome is the principal European center of the Mardis gras festival.

In America it has been celebrated with great splendor by the people of New Orleans since 1857. In that city the merrymaking begins at daybreak, and all the day the streets are filled with gay revelers in masques and masquerade costumes. One may see cowboys, Indians, negro minstrels, toreadors, Chinamen, Turks, princes in velvet and satin, clowns in motley array, and even mock policemen. Men, women and children join in the fun, and the city is turned over to "King Rex and his mystic crew of Comus."

A brilliant feature of both the day and evening celebration in New Orleans is an elaborate parade, including a procession of floats, or stages mounted on wheels, on which characters pose in tableaux representing legends, fiction or historical events. The Royal Parade Ground (Canal Street) is made splendid with flags, bunting, banners, streamers and fringes, and at night it becomes a gorgeous spectacle of electric illumination. After the evening parade a grand festival ball is held in the Old French Opera House, and it is not until midnight that the sounds of revelry pass into silence. The following day, Ash Wednesday, ushers in the season of Lent.

MARE ISLAND, an island two miles long, at the east end of San Pablo Bay, twenty-five miles north of San Francisco, Cal. It is separated from the city of Vallejo by a strait half a mile wide, and there is ferry connection with that city. A United States navy yard, on the west shore of the bay, is the most important of the Federal naval yards on the Pacific coast. War vessels are built there, and there are ordnance yards, marine barracks, dry docks, a hospital and an observatory. A lighthouse stands on the southern extremity of the island.

MARENGO, *ma ren'go,* BATTLE OF, a decisive battle between the French and Austrians, won by Napoleon, June 14, 1800. In 1798, taking advantage of Napoleon's absence in Egypt, England, Russia and Austria formed an alliance against France. Returning in 1799, Napoleon found that though Russia was again friendly, the success of the alliance was undermining his power. Accordingly, he mustered 40,000 men, and rejecting the idea of advancing by sea on Italy, which was then in Austria's hands, he took the more secret and dangerous route across the Alps through the Saint Bernard Pass. The battle of Marengo began in the morning, and by noon it appeared that the French were beaten; but Napoleon fought stubbornly until mid-afternoon, when reënforcements arrived. The day was saved; Napoleon lost General Desaix, one of the few whom he loved and trusted, but he gained Genoa, Piedmont and Milan, and his prestige in France was again secure.

MARÍA CHRISTINA, *ma re'a kris te'na* (1806-1878), a queen of Spain, the daughter of Francis I, king of the Two Sicilies, and grandmother of King Alfonso XIII. She was the fourth wife of Ferdinand VII, and bore him a daughter, Isabella II, who, in virtue of a proclamation issued before her birth, became heiress to the kingdom. Upon the death of Ferdinand, María Christina was appointed guardian of the young queen. Soon a civil war

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broke out, because of the ambitious designs of Ferdinand's brother, Don Carlos, who aspired to the throne. The queen mother took very little interest in the affair, preferring to bestow her attentions upon one of her royal bodyguard, whom she married in 1833. Because of this she became exceedingly unpopular, and was obliged to flee to France. In 1848 she returned, but her actions became so distasteful to the patriotic party in Spain that in 1854 a revolution expelled her from the country. In 1864 she again returned, only to be driven into exile again four years later. She died at Le Havre in 1878. See ALFONSO XIII.

MARIA LOUISA, *ma ri' a lo e' za* (1791-1847), the second wife of Napoleon Bonaparte, was the daughter of Emperor Francis I of Austria. Her marriage with Napoleon was solemnized in 1810, after his divorce of Josephine (see JOSEPHINE, MARIE ROSE). In 1811 she bore him a son, who was hailed as king of Rome. This prince, who is known in history by the empty title of Napoleon II, died at the age of twenty-one. On the overthrow of Napoleon, not being permitted to follow him into exile, Maria Louisa and her son took up their residence at Schönbrunn, near Vienna. In 1816 she received the Italian duchies of Parma, Piacenza and Guastalla, which she governed till her death.

MARIA LOUISA
She became the wife of Napoleon Bonaparte for reasons entirely political.

Consult Guerber's *Empresses of France;* Cuthell's *An Imperial Victim.*

MARIA THERESA, *ma ri' a teh re' sa* (1717-1780), one of the most important figures in European wars and politics during a critical period of the eighteenth century. She was the daughter of Emperor Charles VI, the last male heir in the direct line of the House of Hapsburg. By the Pragmatic Sanction, a settlement which was guaranteed by the principal states of Europe, her father appointed her heiress to his hereditary dominions. Upon his death, in 1740, she became queen of Hungary and Bohemia and Archduchess of Austria. Later she declared her husband, Francis of Lorraine, joint ruler. On her accession Prussia, Spain, Bavaria and France claimed portions of her dominions, which resulted in the War of the Austrian Succession (see SUCCESSION WARS). The young queen fled to Pressburg, where she threw herself upon the sympathy of her Hungarian subjects. The war continued over seven years, terminating with the peace of Aix-la-Chapelle in 1748, whereby Silesia was ceded to Frederick II of Prussia. However, the titles of the queen were fully recognized, and in 1745 her husband was elected Holy Roman emperor. See FRANCIS (Holy Roman Emperors), subhead *Francis I.*

MARIA THERESA
One of the most influential of eighteenth-century Europeans.

During the peace which followed, Maria Theresa, with the aid of her husband and her able minister, Kaunitz, introduced many financial reforms, greatly diminishing the burdens of her subjects, while agriculture, manufacture and commerce were encouraged. But the loss of Silesia rankled deep in her mind, and in 1756, with France as an ally, she renewed her contest with Prussia, bringing on the Seven Years' War (which see). This again reduced Austria to a state of exhaustion, and Maria failed to recover her lost province of Silesia, but on its conclusion she successfully renewed her efforts to promote national prosperity. Her son Joseph was elected Holy Roman emperor in 1765, upon the death of her husband, and to him she gave the management of the military affairs of her realm. In 1772 she joined in the dismemberment of Poland, obtaining Galicia for Austria, and in 1777 she also obtained Bukowina from Turkey. Of her sixteen children, ten survived her, one of whom was the beautiful Marie Antoinette, wife of Louis XVI of France.

Consult Bright's *Maria Theresa;* Moffatt's *Maria Theresa.*

MARIE ANTOINETTE, *mah re' aN twah net',* JOSEPHE JEANNE (1755-1793), a beautiful queen of France, whose tragic fate is a part of the story of the French Revolution. She was the youngest daughter of the Emperor Francis I and Maria Theresa of Austria. From the cradle her ambitious mother destined her to be the

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queen of France, and at the age of fifteen Marie Antoinette was married to the dauphin, afterwards Louis XVI. As dauphine, the stilted atmosphere of the court had wearied her, and as queen she determined to escape from it. She preferred the liberty of action to courtly etiquette. Her beauty excited jealousy, and her impatience with court conventions and her interference in political matters were looked upon as a source of danger by her subjects. She was sentimental, rash and determined to enjoy her young life to the full, despite the deceitful, wearisome and empty grandeur of the court life so odious to her.

MARIE ANTOINETTE
This royal woman died by the guillotine, a victim of the masses whom she had helped excite to the frenzy and delirium of the French Revolution.

The Petit Trianon (the Little Château) at Versailles, the gift of Louis XVI to his queen, is sacred to the memory of Marie Antoinette. In the surrounding gardens and the Swiss chalet the young queen sought novelty and relaxation when her ministers thwarted her on all sides and her subjects scowled menacingly because of her extravagant pleasures—she was called *Madame Deficit* and *Madame Veto*—and as a result, in 1789, an infuriated, hungry mob, composed chiefly of women who had been worked up to a frenzy by slanderous stories, attacked Versailles. The queen alone maintained her courage and calmed the crowd. That day the royal family left Versailles. The French Revolution was now at its height. When they were practically prisoners in the Tuileries, the royal palace in Paris, it was Marie Antoinette who advised the flight of the royal family in June, 1781, which ended in their capture and return to the capital.

Ere long the palace of the Tuileries was stormed. Louis XVI was tried and quickly executed, the boy prince was torn from the arms of his mother, and the queen was sent to prison like a common criminal, where she suffered insult and brutality at the hands of her guards. She bore herself with calmness and dignity during the terrible days of her trial, and on October 16, 1793, was guillotined in Paris. The Obelisk of Luxor, in the Place de la Concorde, now marks the spot where Marie Antoinette and Louis XVI, the last royal couple of France before the Revolution, paid the price for their extravagances and those of Louis XIV and XV. See FRENCH REVOLUTION; LOUIS, subhead *Louis XVI*. R.D.M.

Consult Bicknell's *The Story of Marie Antoinette;* Beloc's *Marie Antoinette.*

MARIETTA, *may ri et' a,* OHIO, is the oldest city of the state. It is the county seat of Washington County, picturesquely located on the Ohio River, where it is joined by the Muskingum. The city is 115 miles southeast of Columbus and eighty-one miles southwest of Wheeling, on the Baltimore & Ohio, the Marietta, Columbus & Cleveland, and the Pennsylvania railroads. There is interurban electric service and river traffic with Pittsburgh, Cincinnati and other Ohio River cities. The population, which in 1910 was 12,923, was 14,785 in 1916, the increase being partly due to annexation of territory in 1912.

Marietta College, a coeducational institution, is situated here, and the city has a fine courthouse, Federal building, armory, large public library noted for works on the history of the Northwest, Carnegie Library (constructed in 1916), Y. M. C. A. building, two hospitals and a Children's Home and Old Ladies' Home.

Surrounding Marietta is a large oil territory; the annual county product is 1,300,000 barrels. Other natural resources are coal, gas, iron, clay and stone. The city has more than fifty manufacturing plants, which employ 2,000 men; chief among the articles produced are iron and steel, refined petroleum, harness, chairs, safes and cabinets, paints, chemicals, stoves and glass.

Marietta was founded in 1788 by a company from New England under the leadership of General R. Putnam, and was named in honor of Marie Antoinette. In the same year the Northwest Territory (which see) was organized here. Marietta was first incorporated as a town in 1800. Earthworks of the ancient mound builders are among the numerous historical features of the city. J.H.W.

MARIGOLD, *mair' i gold,* an old-fashioned, sturdy flower of European and American gardens—truly old-fashioned, for Shakespeare knew it as "The marigold that goes to bed wi' th' sun, and with him rises weeping." Shakespeare had probably seen the big drop of dew in the folded petals early in the morning. There are many kinds of marigolds, all of some

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shade of yellow or orange. The so-called African and French marigolds both originated in Mexico, and were developed in France from little, wild blossoms to exquisite flowers. The English *corn marigold* grows wild in the cornfields. All have a peculiar strong, but pleasant, odor. They, with the sunflowers, asters, dandelions and others, are called *composite,* for they combine many very small flowers grouped around a large center. The marigold plants grow from one to two feet high. The leaves are feathery. They are annuals, but grow without much care and bloom well for a long period. See ANNUALS.

Open afresh your round of starry folds,
Ye ardent marigolds!
—KEATS.

MARINE CORPS, *ma reen' kohr,* a corps of sea soldiers specially trained for naval warfare and serving for the most part on board ship. The position of the marines, who were at first regarded as neither soldiers nor sailors, rendered them subject to undeserved ridicule, for their place in the military and naval scheme was little understood. They are now highly esteemed as the "soldiers of the navy."

Only in the British and the United States navies are the marines a specially organized force performing specified functions on board ship. The word *marine* is sometimes used by other powers, but in other countries marines are only used for coast defense or to garrison forts and colonies. The marines in the British service are two corps, the Royal Marine Artillery, and the Royal Marine Light Infantry. Their duties are military, the sailors manning the ship while the marines fight or form landing parties.

The United States marines date from the foundation of the navy, and are regarded as one of the most efficient bodies of men in the forces. On board ship they perform sentry and orderly duties and police duties. In many ships they serve the guns and act as riflemen. The marines are always sent first when a landing party is required; in whatever part of the world help is asked of a United States war vessel, the marines are landed. For years they have helped to keep the peace in Central American countries and in islands of the sea, and they performed important work in Mexico in 1914. During the American occupation of Vera Cruz, in that year, parties of marines were sent to police the town, and in the fighting which preceded the occupation of the city they lost seventeen of their number. Candidates for enlistment as marines must be between the ages of eighteen and thirty-five. The full peace strength of the corps is 646 officers and 15,000 noncommissioned officers and men. In case of emergency that number may be increased. A brigade of three battalions of marines did good service in the Philippines in 1899. The corps badge or device is a globe resting on an anchor surmounted by an eagle. On their colors is inscribed "Tripoli," recalling that in 1803 they planted the American flag in Tripoli during the war with the Barbary states (see BARBARY STATES).

Consult Collum's *The History of the Marine Corps;* Cooper's *History of the Navy.*

MARINETTE, *mair i net',* WIS., the county seat of Marinette County, claimed to be the most important lumber center of the Northwestern states. In 1910 the population was 14,610, Scandinavians predominating in the foreign element. The city is situated in the northeastern part of the state, on Green Bay, at the point where the Menominee River, which separates Michigan from Wisconsin, discharges into the bay. Menominee, Mich., across the river, is connected with Marinette by bridges and by steam and electric railways. The city of Green Bay is forty-nine miles southwest, and Chicago is 262 miles south. Besides railway service of the Chicago & North Western, the Chicago, Milwaukee & Saint Paul and Wisconsin & Michigan railways, the city has steamer connection with all lake ports of importance. Marinette was settled in 1857, was incorporated as a city in 1887, and named for Marinette, an Indian woman. The area exceeds five square miles.

Marinette has a good harbor and a large lake commerce; the river, on which lumber is brought down from the forests in Michigan and Wisconsin, is an important factor in the development of the lumber industry. The large lumber mills lead in the industrial establishments, which include manufactories of furniture, pails, boxes, brooms, paper, pulp, flour, steam-threshing machines, cooperage supplies, gas and traction engines. The value of the annual output of the various products is estimated at $2,500,000. Notable buildings are

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the Federal building, erected in 1907, a public library with 15,715 volumes, the gift of Senator Stephenson, and Our Lady of Lourdes' Institute. C.R.J.

MA'RION, FRANCIS (1732-1795), one of the most daring of colonial leaders in the American Revolution. His grandfather was a Huguenot refugee whose independent and brave spirit was inherited by the boy. As lieutenant, he commanded a troop of colonists against the Cherokee Indians in 1761. In 1775 he was a member of the provincial congress. He entered the army as captain after the Declaration of Independence, was soon raised to the rank of major, and in 1780 was made brigadier-general of the South Carolina state troops. This command was not strong, for his men were poorly equipped and insufficiently fed. However, with their help he succeeded in making communication impossible for British posts in the Carolinas, took many prisoners, relieved surrounded troops, and took part in important victories, notably at Nelson's Ferry and Eutaw Springs. The British officer, Colonel Tarleton, who was especially ordered to take him, said he could not catch the "old swamp fox." After the war Marion was made commander of Fort Johnson, and was for several terms a member of the state senate of South Carolina.

MARION, IND., the county seat of Grant County, is situated northeast of the geographical center of the state, on the Mississinewa River (west fork of the White River). Indianapolis is seventy-three miles southwest, Chicago is 157 miles northwest, and Detroit is 234 miles northeast. Four trunk lines serve the city—the Cleveland, Cincinnati, Chicago & Saint Louis; Pennsylvania; the Toledo, Saint Louis & Western, and the Chesapeake & Ohio railways; interurban electric lines connect with Indianapolis and other cities. Marion was settled in 1832, was incorporated in 1887 and was named in honor of General Francis Marion, a Revolutionary leader. The population increased from 19,359 in 1910 to 19,834 in 1916 (Federal estimate); ninety per cent are Americans. The area is nearly five square miles.

Through excellent transportation Marion is a commercial center of importance, the principal articles shipped being the products of its own manufacture and of the surrounding agricultural region. These include corn, wheat, oats, cattle, hogs, sheep, horses, glass, flour, linseed-oil, paper, pulp, bricks, foundry products, shoes and gasoline motors. The railway tonnage shipped is nearly a thousand tons daily. Natural gas found in the vicinity and water power furnished by the river increase the manufacturing interests. The city has a $125,000 Federal building, erected in 1908, a Masonic Temple, a fine courthouse, and Y. M. C. A. and Y. W. C. A. buildings. Beside its public schools it has Marion Normal Institute, a business college and a Carnegie Library. Three miles south of the city is located a National Soldiers' Home, erected at a cost of $1,500,000. H.E.T.

MARION, OHIO, the county seat of Marion County, is forty-five miles north of Columbus, the state capital, and seventy-five miles southeast of Toledo. It is on the Cleveland, Cincinnati, Chicago & Saint Louis, the Hocking Valley, the Pennsylvania and the Erie railroads, and has electric lines to Mansfield and Columbus. The area of the city is about six square miles. The population in 1910 was 18,232; in 1916 it was 23,430 (Federal estimate).

The city contains a Federal building, erected in 1910 at a cost of $90,000, a Carnegie Library, an Elks' Home, three private hospitals, a normal school, an Old Ladies' Home and the Marion County Children's Home. The importance of the city's steam shovel manufactories has given Marion the name of "Steam Shovel City." One factory employs 2,000 men, and its annual output is valued at $10,000,000. Other manufactures are iron, silk, pianos, racing sulkies, dredges, farming implements and steam engine and boiler works. Near the city are large limestone quarries.

Marion was settled in 1815, incorporated in 1820 and became a city in 1890. C.B.H.

MARIUS, *may'rius,* CAIUS (about 156-86 B. C.), a great Roman military leader and a fearless warrior, before whom it is said men dropped their swords in terror. He was born of obscure parents and was uneducated, rude and arrogant. He first won military distinction in Spain, during the Numantine War, and from that time his rise was rapid. He was elected tribune, and soon acquired power and social standing by his marriage with Julia, aunt of Julius Caesar. In 114 B. C. he cleared Further Spain of robbers, and in 107 was elected consul and intrusted with the conduct of the Jugurthine War, which he successfully ended.

Having become the most conspicubus officer in the Roman army, Marius was called to the consulship the second time and was sent to defend the Roman dominions against a horde of German barbarians who had broken into Gaul. These he annihilated in the famous two-

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days' battle of Aquae Sextiae. He was elected consul for the third, fourth, fifth and sixth times, as it was deemed that he alone could save the republic. He was classed with the gods by the people of Rome. Then his popularity declined, because of his association with disreputable leaders. He attempted to remove his patrician rival, Sulla, from his command in the Mithridatic War, and a civil war resulted, during which Marius fled to Africa. Afterwards, during the absence of Sulla, he returned to Rome and won a decisive victory over his enemy. He was then elected to the consulship the seventh time, but died after serving seventeen days. See SULLA, LUCIUS CORNELIUS.

MARJORAM, *mahr'jo ram,* a shrub or herb which the Romans and Greeks wove into wreaths to crown the newly married. It is found in the Mediterranean region and in Great Britain, and has also been naturalized in parts of the United States and Southern Canada. It grows from one to two feet in height, has woody stems, and its leaves are small and pointed and pale green in color. The flowers are two-lipped and of a pinkish white, and the seeds are small. Sweet marjoram, the cultivated variety, has an aromatic taste and pleasing odor, and is highly esteemed as a seasoning in cookery.

MARK, a silver coin which is the monetary unit of the German Empire, as is the dollar in the United States and Canada. It weighs .3982 grams and is equal in value to 6.146 grains of gold nine-tenths pure. Its value in United

THE GERMAN MARK
About the size of the 25-cent piece of Canada and the United States, and valued at nearly 24 cents.

States and Canada money is 23.8 cents, usually, however, estimated at twenty-four cents. The mark is equivalent to 100 *pfennigs.* Gold coins valued at ten and twenty marks are issued. The term *mark* was originally used in Europe to designate eight ounces of gold or silver.

MARK, SAINT, an energetic evangelist in the time of Christ, who included not only his own teachings, but also those of Peter in his Gospel, which forms the second book in the New Testament. His home in Jerusalem, where his mother Mary lived in comfortable circumstances, was in his youth a gathering place for Christians. He accompanied Paul and his cousin Barnabas on their first missionary journey, but on account of a disagreement left them at Perga and returned to Jerusalem. Later he sailed for Cyprus with Barnabas to resume evangelistic work. For ten years afterwards nothing was heard of him, until suddenly he joined Paul at Rome; by that time their misunderstanding had passed. From that time on until his death Mark was associated with both Paul and Peter in their missionary work, and tradition says that he was the founder of the church at Alexandria. The time and place of his death are unknown, but the important fact in his life is that his association with the chief apostles fitted him to write the gospel which bears his name. See GOSPELS.

MARK ANTONY, *an'to ni.* See ANTONY, MARK.

MARKHAM, *mahr'kam,* EDWIN (1852-), an American poet and lecturer, author of one of the best appreciated of modern poems, *The Man with the Hoe,* which was inspired by Millet's painting on the same subject. Markham was born in Oregon, and when five years old was taken by his parents to California. There he passed his boyhood, working as a farmer, blacksmith and cattle and sheep herder. He studied at the San José Normal School and at Christian College, Santa Rosa, and later became a school superintendent. From an early period he had written verse for California papers, winning thereby considerable local fame, but the publication of his *Man with the Hoe,* in 1899, brought him world-wide notice. So great was the success of this poem, which was acclaimed "the battle-cry of the next thousand years," that he decided to try his fortunes in the East, and since 1899 has lived in or near New York City.

Markham's other important writings include *Lincoln, and Other Poems; The Poetry of Jesus,* a series of essays; *The Social Conscience* (a baccalaureate sermon for Leland Stanford University, 1897); and a series of magazine articles covering the problem of child labor, entitled *The Hoe-Man in the Making.*

MARKS'MANSHIP. There is a very well known and proverbial saying that the one most proficient in anything is he who "hits the bull's-eye." Now to hit the bull's-eye one must be a marksman. To become one it is abso-

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lutely necessary to make up one's mind to work with a determination to succeed.

The rifle is the first weapon to be considered in the art of shooting. The beginner should use a rifle that has the plain, open sights. The gun containing the hair-trigger and peep-and-globe sights should be avoided in preliminary marksmanship.

After you own a rifle, become acquainted with it before you begin shooting. Know your gun and know yourself. Take hold of the rifle with the right hand, gripping the stock firmly. Make sure the grip is from center of the palm, so there will be no slip of the stock and so one can get a long reach with the index finger. The beginner must first try to obtain the lift of the gun without using a support to raise it to the shoulder. After the rifle placement, with the gun butt in the arm socket, raise the right elbow to a position parallel with the shoulder edge. Then grasp the rifle with the left arm extended. Once in this position, place the gun so that the fore stock may be gripped firmly by the left hand. Press the gun firmly against the shoulder, and follow this pose with a reach for the trigger. The effort must result in the first joint of the index finger clutching the trigger. Then take aim. Be sure to stand erect. Take care that the body is balanced evenly. Do not use a rest. As you take aim hold the breath and concentrate the mind upon the target. Pull the trigger gently. Do not jerk the rifle, for a hard pull will make the shot go wild. By breathing through the nose, as breath should be drawn, the beginner can avoid giving the rifle a slight momentum, and is thereby enabled to make a steadier shot. Always aim at the lowest part of the bull's-eye when practicing upon a target.

In starting early practice one should at no time shoot at anything except stationary objects. Once the off-hand position is mastered the beginner then can take up the other position at his own inclination.

Do not become discouraged at first; constant practice makes perfect the art of shooting. As one continues in the work he will learn more rapidly how to become proficient with the gun than he can through continual instruction from any master or expert. In using a military rifle commence with shooting-gallery ammunition at 100 feet range. After having attained perfection with this ammunition, use full charges. Always prepare yourself for the recoil.

To become a perfect marksman, which is the ambition of most boys, one must be much out in the open air; he must fill his lungs with oxygen that will help build up his system. Marksmanship goes hand-in-hand with health. No proficiency can be obtained with any gun unless the person be physically qualified to become expert in the art of shooting. Temperate habits and fresh air are highly essential in keeping the eyes clear, the mind refreshed, the heart beating regularly, and the nerves as steady as steel. J.D.L.

MARK TWAIN. See CLEMENS, SAMUEL LANGHORNE.

MARL, a term rather loosely applied to certain mixtures of clay and carbonate of lime. Marl is a valuable fertilizer when its various constituents are suited to the requirements of a given soil, and this is its chief industrial use. Slaked lime, which has a quicker action, is an efficient substitute for marl. Shell marl is a soft, crumbling deposit of the remains of shell-fish and water plants found on the bottoms of lakes and ponds. When such deposits become stone, they are known as fresh-water limestone. See FERTILIZER.

MARLBORO, *mahrl'bur o,* MASS., a manufacturing city in Middlesex County, in the eastern part of the state, twenty-eight miles west of Boston and fifteen miles northeast of Worcester. The main automobile route from Boston to New York state passes through Marlboro and Worcester. Two great railway systems serve the city, the New York, New Haven & Hartford and the Boston & Maine. Electric lines connect with cities south, west and north. French, Irish and Italians comprise two-thirds of the population, which increased from 14,579 in 1910 to 15,187 in 1916 (Federal estimate). The area exceeds twenty square miles.

In the great variety of manufactures in Marlboro shoes and boots lead. Shoe-making machinery, automobiles and tires, electrical machines and accessories, bicycles, carriages, wagons, woodenware, cigars, miners' lamps and machine-shop products are also included in its output. The city has a fine city hall, a post office, a $65,000 high school, a public library and Saint Ann's Academy. Lake Williams, a quarter of a square mile in size, is near. Wellesley College, for girls, sixteen miles distant, is connected by a trolley line with Marlboro.

The first settlement was made in 1656 by a colony from Massachusetts. In 1660 it was incorporated as a town, and in 1890 it became a city. It was named for Marlborough, England.

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During King Philip's War in 1676 the town was almost completely destroyed by the Indians. From the original township, Westboro was founded in 1717, Southboro in 1727, and Hudson in 1866. F.L.G.

MARLBOROUGH, *mahrl'bo ruh,* or *mawrl' bruh,* JOHN CHURCHILL, Duke of (1650-1722), one of England's greatest generals. Born at Ashe in Devonshire, and educated at Saint Paul's school, London, he entered the army very early and first saw service at Tangier, fighting against the Moors. Under the great General Turenne he served against the Netherlands, in the first battles in which musketry and artillery entirely replaced the old-style weapons. The promotion of Churchill was rapid, and though he showed ability his rise was mainly due to the influence of his sister. His marriage to Sarah Jennings, lady-in-waiting to Princess Anne, secured him the favor of that princess, and when the Duke of York ascended the throne as James II, he became more powerful and was placed in charge of the troops to suppress the Monmouth rebellion, which he did most thoroughly.

As the Roman Catholic inclinations of James II became more clearly indicated, Churchill gradually withdrew from important affairs and was one of the first to join William III when he was invited to accept the English crown. William realized Churchill's influence with the army, so he created him Earl of Marlborough and gave him important commands. On the outbreak of the War of the Spanish Succession William placed him in command of the British troops in the Netherlands.

On the death of William the Princess Anne came to the throne, and Marlborough was in royal favor. The Duchess of Marlborough dominated the queen, and Marlborough felt that his power was on a solid basis. He was appointed captain-general of the Dutch forces, and he conducted some remarkably successful operations against the French, driving them out of Liége and other towns, for which service he was created Duke of Marlborough. The French and Bavarian lines at Donauworth were stormed, and he effected a union with the forces of Prince Eugene of Austria, in conjunction with whom he obtained the decisive victory of Blenheim. Later followed the victories of Ramillies, Oudenarde and Malplaquet. The road to Paris was open, but Marlborough had lost his influence at home and could not follow up his advantages. His haughty wife had offended the queen, who at last asserted herself and dismissed the duchess from the court. Marlborough was relieved of his command and accused of embezzlement of public money. Deprived of his offices, he yet had a fortune, granted him for his military services, and he retired from public life.

Although the character and motives of Marlborough have been strongly assailed, his military genius has never been impeached. His final downfall was not due to any lack of ability on his part, but to the duchess's inability to curb her haughty temper. After Queen Anne's death in 1714, Marlborough was again appointed captain-general by George I, but he took no active part in affairs and remained in retirement on his estate. F.ST.A.

Consult Green's *History of the English People;* Alison's *Military Life of the Duke of Marlborough.*

Related Subjects. The reader is referred to the following articles in these volumes:

Anne	Monmouth, Duke of
Blenheim	Succession Wars
James II	William III

MARLOWE, *mahr'lo,* CHRISTOPHER (1564-1593), the first English writer of great tragedies and the first to use the form of blank verse. He blazed the trail for Shakespeare, who was soon to follow. Marlowe was of humble parentage, his father being a shoemaker in Canterbury; his education was completed at Cambridge. After graduation, he went to London, where he immediately began to write plays. He was associated in college days and later with brilliant men, leaders in literary and dramatic art and was one of what was called Sir Walter Raleigh's School of Atheism. He was an original and brilliant thinker, no doubt urged to extremes by the stupid dogmatism of his time. He met his death in a quarrel. His greatest works are *Tamburlaine the Great, Edward II, Doctor Faustus* and the *Jew of Malta.*

MARLOWE, *mahr'lo,* JULIA (1870-), known in private life as Mrs. Edward Hugh Sothern, is an American actress of unusual personal charm. Her specialty was in Shakespearean rôles, such as Portia in *Merchant of Venice,* Juliet in *Romeo and Juliet,* and Rosalind in *As You Like It.* After 1904 she appeared almost continuously in these rôles for ten years with Mr. Sothern, whom she married on August 17, 1911.

Although born in Cumberlandshire, England, Julia Marlowe, whose real name was SARAH FRANCES FROST, moved with her parents, at the age of five, to America, and settled in Kansas.

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Later the family moved to Cincinnati, where the little girl attended the public schools until she was twelve, when she joined a juvenile opera company, which presented *Pinafore, Chimes of Normandy* and other light operas. After playing a child's part in *Rip Van Winkle,* she left the stage to study for three years in New York, and in 1888 made her début at Boston as Parthenia in *Ingomar.* From that time on her success was assured. In addition to her many Shakespearean rôles, she appeared as Barbara Frietchie in Clyde Fitch's play of that name, Highland Mary in *For Bonnie Prince Charlie,* and in *When Knighthood Was in Flower.* In 1894 she married Robert Tabor, who was then her leading man, but six years later she divorced him. After ten years of work with E. H. Sothern, she retired from the stage in August, 1915, on account of ill health. See SOTHERN, EDWARD H.

JULIA MARLOWE

Consult Strang's *Famous Actresses of the Day in America.*

MARMORA, *mahr'mo ra,* SEA OF, an oval body of water, once called *Propontis,* lying in Eurasia between the Black and Aegean seas. It is connected with the former on the northeast by the Strait of Bosporus, and with the latter on the southwest by the Dardanelles (which see). It is about 160 miles long, its greatest width is less than fifty miles, and its area is about 4,500 square miles. It is more than twice as large as Prince Edward Island, and somewhat smaller than Connecticut. The sea forms a waterway for vast commerce. It contains several islands, among them Marmora, noted for the beautiful marble and alabaster obtained from its quarries. The great city of Constantinople lies at the northeastern extremity of the Sea of Marmora, and both came into world-wide notice in 1915, during the War of the Nations, when the Allies, particularly England and France, sought entrance into the sea by way of the Dardanelles. This spectacular campaign, which had Constantinople as its objective point, was abandoned after nearly a year of futile fighting (see WAR OF THE NATIONS).

LOCATION MAP

MARMOSET, *mahr'mo zet,* the family name of the smallest of the monkeys, which are not larger than a squirrel or a half-grown kitten. They live in South America. Their coat is long, soft fur, beautifully colored. Some marmosets have tufts of hair on the top of their ears, and the *silky marmoset* has a great pompadour of long fur. Their tails are long, covered with fur, and ringed with bands of black and gray. Although this little creature lives in trees, it does not use its tail to hold to the branches, as do most monkeys, for it is too short. The marmosets eat the fruits and insects they find in the trees. The most common marmoset, called *ouistiti,* is a popular South American pet and thoroughly enjoys being cared for. It cannot live, however, when taken to cool climates.

MARMOT, *mahr'mot,* a small member of the ground squirrel family, which resembles the rat in form and habits; in the arrangement of its teeth, however, it is like the squirrels. The common marmot is a native of the Alps, the Pyrenees and the more northern mountains of Europe. Marmots are about the size of rabbits, and have short legs and tails and thick bodies. Their fur is grayish-yellow, becoming brown toward the head. Their food consists of insects, leaves and roots. They dig large burrows and provide two entrances, and in them they spend the winter.

THE MARMOT
About one-twelfth actual size.

The prairie dog and woodchuck of North America are species of marmot, but they have more solitary habits than their European cousins. See GROUND HOG.

MARNE, *marn,* the largest tributary of the River Seine, rises in the plateau of Langres,

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flows with many turnings northwest and then westward across the eastern part of France and empties into the Seine about four miles above Paris. It is a rapid stream and supplies power to many mills; it has been canalized and dredged until it is navigable for 226 miles and connects by canal with the Rhine at Strassburg.

LOCATION MAP
It was on the Marne that the German drive on Paris was halted, and the whole tide of war in the world struggle was changed.

Battle of the Marne, one of the early encounters of the great War of the Nations, was really not a single battle, but a series of desperate engagements lasting from September 6 to September 12, 1914. The battle front was over 140 miles long, from near Paris to Verdun, and more than two and one-half million men, the largest number up to that time ever engaged in one battle, took part. The Germans were only thirty-five miles from Paris; they had driven the French and the few English in confusion for over two weeks, but at a vital moment the French and English turned upon their pursuers. In the six days following the Germans were driven back to their line of forts on the Aisne River.

This Battle of the Marne was the most critical of the first period of the war, and is already classed as one of the few decisive battles of the world. It ended the German effort to reach Paris, which, had it succeeded, would doubtless have made Germany victorious in the great war and the dictator of Europe. The Battle of the Marne was a boldly conceived, carefully devised and admirably executed stroke which produced results of incalculable importance. General, later Marshal, Joffre during those September days won for France one of the most vital battles in all history.

MARQUE AND REPRISAL, *mark, repri'zal,* LETTER OF, a written commission or license granted by the supreme power of a nation at war to private persons who own ships, authorizing them to pass beyond the three-mile international boundary and conduct hostilities against the enemy. Such vessels were known as *privateers,* and the prizes captured were divided among the owners of the vessels, their captains and their crews. Warring nations with but small navies resorted to this method as early as the sixteenth century, but by the Treaty of Paris in 1856 letters of marque were abolished by the nations of Europe. The United States declined the invitation to join this arrangement, but it abandoned privateering. At the beginning of hostilities between the American government and Germany, in April, 1917, the former pressed into service many large, private yachts to hunt submarines, but they became government vessels and their private character was lost. They were, therefore, not privateers.

MARQUESAS, *mahr ka'sas,* **ISLANDS,** a group of volcanic islands belonging to France, lying in the Pacific Ocean about midway between South America and Australia, in the same latitude as the northernmost point of the latter continent. They are eleven in number, and have a total area of 480 square miles. Only six of the islands are inhabited, and their combined population, which is slowly decreasing, is less than 3,200. The Marquesans, who are physically a superior group of the Polynesian race, have adopted the customs of civilization and the teachings of Christianity. They are skilful producers of carved and ornamented axes and oars, cocoanut slings, carved clubs and other specimens of handicraft, and subsist chiefly on breadfruit, which grows abundantly on the islands.

The southern group of islands was discovered in 1595 by Mendana de Neyra, a Spanish navigator; the northern group was sighted in 1791 by an American traveler who named his discovery the Washington Islands. Commodore David Porter, of the *Essex,* proclaimed the islands United States territory in 1813, but the government neglected to claim them; they were far from America's sphere of influence. In 1842 they were annexed to France.

MARQUETTE, *mahr ket',* JACQUES (1637-1675), a French missionary and explorer in America. He was born at Laon, became a Jesuit, and in 1666 was sent out to Canada by his Order as a missionary. For two years he lived with another missionary, learning the customs and language of the Indians, and in 1668 was sent to the upper lakes. He worked at Sault Sainte Marie and at Mackinaw, but in 1673 was instructed to give up his mission there and accompany Joliet on his exploration of the Mississippi River. By way of Lake Michigan, Green Bay, Fox River and Wisconsin River, with portages between, they reached the Mississippi, which they descended to the mouth of the Arkansas. Fearing to go further on account of

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the Spaniards, they returned by way of the Illinois River, having spent four months on the journey.

Marquette's health was very poor, and on an expedition which he undertook, the next year, to found a mission among the Illinois Indians, he grew steadily worse. On the return journey he died, near the present site of Ludington, Mich. Several places claim the distinction of being his burial place, but beyond doubt his remains lie at Saint Ignace, Mich., across the Strait of Mackinac to the west of Mackinac Island. Marquette's influence on the Indians was deep and lasting.

MARQUETTE
Illustration is from a statue in Washington, D. C.

Consult Thwaites' *Father Marquette;* Finley's *French in the Heart of America.*

Related Subjects. The reader is referred to the following articles in these volumes:

Hennepin, Louis	Joliet, Louis
Illinois (Indians)	La Salle, Sieur de
Jesuits	

MARQUETTE, MICH., the county seat of Marquette County, and a shipping point for an important mining region, centrally located on the north shore of the Upper Peninsula, 372 miles by rail, 500 miles by water, north of Chicago. The city is situated on Iron Bay, an inlet of Lake Superior, and has a good harbor protected by two breakwaters, constructed by the Federal government at a cost of $2,000,000. A number of boats sail regularly between this and other lake ports, and the Duluth, South Shore & Atlantic and the Munising, Marquette & Southeastern railroads enter the city. The population in 1910 was 11,503; in 1916 it was 12,409 (Federal estimate). Swedish, Germans and Finnish predominate among those of foreign descent. The area of the city is ten square miles.

Marquette is a favorite summer resort, and is noted for beautiful scenery and excellent climate. It is the seat of the Northern State Normal School, and has a Federal building erected in 1893 at a cost of $100,000, a city hall, a courthouse, the Peter White Public Library, three cathedrals, Saint Mary and Saint Luke hospitals, Roman Catholic orphanage, the State House of Correction and the upper peninsula branch of the state prison. One of the city's most attractive features is Presque Isle Park, a wooded section on a headland which was the gift of the Federal government.

Marquette has some of the largest ore docks in the world, and is the shipping port for the rich Marquette iron range. Coal is brought to the city as ballast in the returning ore boats. Among the most valuable resources of the locality are great tracts of pine timber and quarries yielding trap-rock, a very hard paving stone. The industrial establishments include blast furnaces, chemical works, iron works, foundries, machine shops, lumber and woodworking mills, and a wood-alcohol plant. Marquette was settled in 1845 and named in honor of Father Marquette. The commission form of government was adopted in 1914.

MARQUIS, *mahr'kwis,* a degree of nobility in the British peerage. Only a duke, among the peers, ranks higher than a marquis, an earl and baron holding lower rank. The name, which comes from the Latin through the French, is related to the term *mark,* signifying a frontier or outlying district; and the first marquis, on the Continent, though not in England, was the prefect of a frontier region. The title has now lost all such geographic significance.

MARRIAGE, *mair'ij,* the term which defines the social and legal relation of a man and woman who are joined in wedlock; the word also names the ceremony that joins them. The marriage relation is peculiar in that while two parties may by mutual agreement enter into it, once having done so the rights, duties and obligations are supposed to be continued uninterruptedly during the lives of the two.

Who May Marry. In the United States there are no uniform marriage laws, but the degree of relation within which parties may not marry is clearly defined by civil and canonical law. In England the table of consanguinity (blood relationship) has been drawn up by the Established Church and is printed in every prayer book for use in the services of the church. It is a disputed point, however, as to whether this generally accepted table of consanguinity is in reality legal or only obeyed because it has become customary. Apart from prevention through consanguinity, some state laws allow females of twelve and males of fourteen to marry, other states denying the right of marriage to females below the age of eighteen

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and males below twenty-one. The legal age limit is generally established according to the old Roman law, under which females of twelve and males of fourteen reach marriageable age, but custom has entirely abolished such early marriages. The statutes of England and Canada still retain this decision, and deviation from this rule is the result of public opinion demanding a more mature age, rather than legal measures. It is now understood, if not actually demanded by the law, that in Great Britain and its dominions the parties to a marriage, unless with full consent of the parents, must have reached in the woman's case eighteen years and in the man's, twenty-one years.

In the United States the tendency is to raise the average marriage age, which is now sixteen years for women and eighteen for men, and to insist on the consent of parents or guardians if both contracting parties are not of legal age. In Wisconsin in 1913 a law was passed and declared constitutional, which requires medical proof of the soundness of health of both parties to the marriage. This statute aroused world-wide discussion, for it was a radical measure indicating an entire change of public opinion as to the rights of a state to take legal measures to promote healthful citizenship (see EUGENICS).

History of Marriage. In primitive times, women were the common property of the horde or tribe, and there was no attempt at division by families. Children were known as the sons and daughters of certain women, but knew no fathers. When men came to abandon the nomadic life (see NOMAD LIFE), settled in communities and divided the land so that each man had his own property, they began to select their women and made them a part of their personal effects. In those days possession, however obtained, was the only form of marriage, the woman having no status except as a slave. Every man claimed the woman he captured in war; all women became wives and slaves. The captured wife was not highly prized; as long as there were tribes to fight and conquer wives were plentiful. When there was no war of conquest to supply them, the custom of the purchase of wives was introduced; this tended to make wives more valuable. Among savage nations the custom of wife capture remained in practice for centuries, and among so-called civilized nations it was countenanced. So deeply rooted was the custom of wife capture that long after it had given place to wife purchase it was usual for a man to go through the form of capturing his wife, with the consent of her parents. The early history of Greece, Rome and Northern Europe shows that before the Christian Era wife purchase had been introduced, though wife capture had by no means completely died out.

In England and Canada at the present day a marriage ceremony performed by a duly ordained clergyman of the Episcopal Church is legal and binding, but in England a marriage ceremony performed by a nonconformist minister is not recognized unless validated by the presence of a registrar of civil marriages. If it is the intention of the contracting parties to be married in church, English law demands that due notice must be given by publication in the church of the "banns," or announcement of the names and residences of the two parties on three consecutive Sundays previous to the marriage, except where a license has been received from the duly appointed authorities to dispense with such announcement. See BANNS OF MARRIAGE.

It has been held in international law that the captain of a ship may legally marry two persons desirous of entering into a matrimonial contract, provided there is no immediate possibility of obtaining the services of a duly-ordained clergyman or justice of the peace, and that the particulars of the wedding be entered in the ship's log book. Under English law a warrant from the secretary of state is necessary before a captain may act as a marriage officer. The law relating to marriage in Scotland differs from that of the rest of Great Britain. The statement by one of two persons, man or woman, in the presence of witnesses, that the other is his or her wife or husband, as the case may be, may be held to constitute a legal marriage.

Civil Law. The Canadian marriage laws are in harmony with those of England, but each province of the Dominion has its own special legislation on the subject. Barrie makes interesting use of this fact in his *Little Minister*.

Illinois, New Hampshire, Ohio, Indiana, Kansas, Arkansas, Nevada, Washington, North and South Dakota, Montana, Louisiana, Oregon, Pennsylvania, Michigan, Nebraska, Utah and Wisconsin prohibit the marriage of first cousins by blood, while New Jersey prohibits the marriage of any person who has been confined in any public asylum as an epileptic, or feeble-minded patient, without a certificate of recovery signed by two physicians, also stating that there can be no danger of transmission.

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Morganatic Marriage. This is a marriage contracted by some member of a reigning house or, in certain countries, by one of the higher nobility, with a woman who is not his equal in rank. It is thoroughly legal, but may not exist side by side with another marriage; the children of such a union may not inherit their father's rank or his entailed estates.

Consult Howard's *The Family and Marriage;* Schuster's *The Wife in Ancient and Modern Times.*

MARRYAT, *mair'i at,* FREDERICK (1792-1848), an English sailor and author of energetic sea stories that have delighted the boys of two generations. After running away from home repeatedly with the intention of going to sea, he was sent out by his father on the frigate *Impericuse* when the lad was fourteen. He took part in some fifty engagements against the French, his ship being part of the squadron of the Catalonians. He saved a great many lives during his service in the navy and was given a gold medal by the Royal Humane Society. The hardships which he endured as a seaman undermined his health, and at the age of forty he retired from naval service and devoted himself to story-writing.

His characters and incidents are taken from his own actual experiences, and one of his old shipmates used to say that to "read *Midshipman Easy* or *Jacob Faithful* was like spending a half day in the Captain's company in his best mood." He has vividly portrayed his commander, Lord Cochrane, in the characters of Captain Savage in *Peter Simple* and Captain M— in *The King's Own.* His stories are unpolished, and his thirty-five or forty volumes manifest very little literary art, but with all their faults they seem more like actual experiences than fiction. Among his best-known books, other than the above, are *Adventures of a Naval Officer, Newton Forster, The Pacha of Many Tales, The Pirate and Three Cutters, Japhet in Search of a Father, Peter Simple, The Phantom Ship* and *Frank Mildmay.* After a visit to the United States in 1837 he published a *Diary in America.*

MARS, *mahrz,* in mythology, was the god of war and one of the greatest of the gods in ancient Roman worship. His sacred emblems were the shield and spear, which the ancients believed had fallen from heaven. These symbols were kept on the altar of the temple devoted to his worship in the Campus Martius in Rome. In legend Mars was the son of Jupiter and father, by Rhea, of Romulus and Remus, the mythical founders of Rome. Because of his strength the Romans regarded Mars as a god who could accomplish all things. They prayed to him for rain, consulted him on all affairs and offered many sacrifices in his honor. When soldiers went to war they carried chickens sacred to Mars, and corn was given these birds just before a battle. If the food was greedily eaten it signified that Mars was on their side, but if eaten sparingly the battle would turn against them.

MARS
From a statue in the Vatican, Rome.

The chief festivals of Mars were in March and October; March was named for the god. The Grecian conception of Mars differs radically from the Roman. The Greeks gave the god the name of *Ares,* and worshiped him as the protector of fields and harvests.

MARS, one of the planets that has been known from very earliest times. It is more like the Earth than any other planet, and more than any other is the subject of study and speculation. The question as to whether Mars is inhabited is almost world old, yet whenever revived is always greeted with interest. Stories, books and plays have been written about inhabitants of Mars; the other planets even in imagination have not been peopled, but human imagination has for many years been determined to people Mars.

Mars is a fiery-red planet that moves with great rapidity among the stars, strongly attracting notice. It derives its name from Mars, the mythological god of war, and is the most aggressive, sturdy and vigorous of the planets. It is 141,500,000 miles from the sun, and its orbit is so eccentric that its radius varies more than 26,000,000 miles. At aphelion (the point most distant from the sun) the planet is 61,000,000 miles from the earth; at conjunction it is 234,000,000 miles distant. At its nearest approach, therefore, it is 148 times as far away as the moon.

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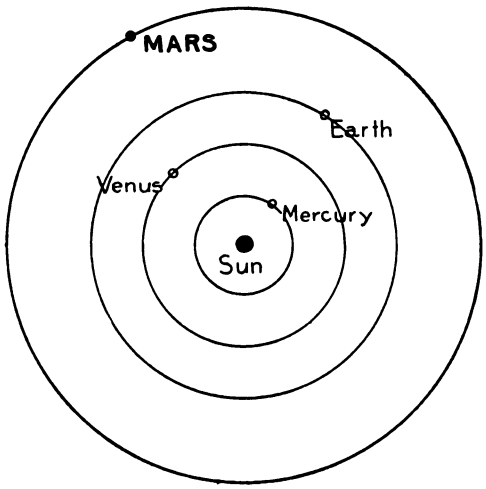
Motions of Mars. Mars rotates on its own axis in 24 hours, 37 minutes, 22 seconds; it requires one year, ten and a half months (687 days), as we count time, to complete its journey round the sun. The seasons are similar to



MARS
Orbit of Mars and of the other three "inner planets" (between Mars and the sun).

our own, but are twice as long. The synodic period, that is, the time taken in traveling from conjunction to conjunction, of Mars, is the longest in the planetary system, being 780 days, during 710 of which the planet progresses towards the east, and during the other 70 it retrogrades.

Comparative Size of Mars. The diameter of Mars is 4,200 miles, about one-half that of the earth. Its surface is about two-sevenths, its volume one-seventh, of that of the earth. Its mass is less than one-ninth that of the earth, and its gravity is about one-third of the gravity of the earth's surface; a man weighing 150 pounds on earth would weigh only about 50 pounds in Mars. The atmosphere of Mars is probably much less dense than that of the earth, but there are indications that an atmosphere exists. The disk of Mars is brightest at the edges, or *limb*. It has been estimated that the *albedo*, or light-reflecting power of its surface, is double that of Mercury, but only half that of Jupiter.

Satellites of Mars. In 1877 two satellites were discovered by Professor Hall of the Naval Observatory, Washington, D. C. They are not visible to any except the most powerful telescopes, for they are among the smallest of known heavenly bodies. The outer one, farthest from the planet and called Deimos, is 14,600 miles distant from the center of the planet and completes its revolution in 30 hours, 18 minutes. The inner one, Phobos, is only 5,800 miles distant, its period being 7 hours, 39 minutes. Measurement of the diameter of such small and distant objects is difficult, but Professor Pickering estimated the diameter of Deimos at 7 miles, and of Phobus at 5 or 6 miles.

Canals of Mars. In 1877 the Italian astronomer, Schiaparelli, discovered features on the surface of Mars which have given rise to almost endless discussion. Five straight lines, ditches, or canals, as they are now called, cross the ruddy surface of the planet in various directions. So like canals do they seem that some astronomers have maintained that they are artificial, and that they are probably used as irrigation ditches. It is also noticed that these lines do not change their position, though sometimes they appear to be double.

Temperature of the Planet. The surface of Mars appears to be marked with indistinct gray patches, which were at one time assumed to be water; however, as the temperature on Mars is considerably lower than at the summits of our highest mountains—below zero, in fact—water could not exist. This has led astronomers to conclude that what appear to be polar ice caps, white patches at both poles which increase or dwindle according to the seasons, cannot be ice, but are formed of condensed gases.

While the differences between Mars and the earth are less than those between any other two planets, it is considered by many scientists that if Mars is inhabited it must be by some beings quite different from the people of earth, but the weight of evidence is against the theory. Others, however, argue that there are "other worlds than ours," and that Mars is one of them. Neither statement can be definitely proved, and Mars will probably continue through the ages a matter of speculation and interest. F.ST.A.

Consult Housden's *The Riddle of Mars, the Planet;* Lowell's *Mars as the Abode of Life.*

Related Subjects. The reader is referred to the following articles in these volumes:

Astronomy	Planet
Conjugation	Star
Mars (war god)	

MARSEILLAISE, *mahr sel ayz'*, in French, *mahr seh yaiz'*, THE, the national hymn of France, written by a young officer named Rouget de Lisle, who composed both the words and the music in a single night during the French

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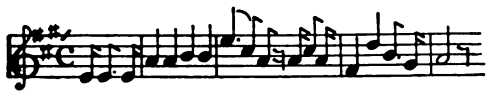
Revolution. When a company of 600 volunteers were leaving Strassburg to join the army in April, 1792, the mayor of the city, who had planned a banquet in their honor, asked De Lisle to compose a song for the occasion. Its



FIRST STRAINS OF THE MARSEILLAISE
The words to the above music, translated, are:
"Ye sons of France, awake to glory!
Hark! hark! What myriads bid you rise!"

stirring music aroused such enthusiasm that 400 more joined the company before it marched off to war. One general said that it was worth as much in his army as the addition of a thousand men.

Although the song became very popular among the soldiers, it was not heard in Paris until the Marseilles battalion sang it as they marched towards the city to storm the Tuileries. From that time it was called the *Hymne des Marseillais,* or the *Marseillaise.* Louis XVIII gave the composer a pension on account of the song, while in the town of Choisy-le-Roi, where he died in 1836, there stands a monument erected to his memory. In July, 1915, at the height of French enthusiasm inspired by the War of the Nations, his body was removed from its temporary resting place in that town and taken to Paris, accompanied by a great procession and military parade. The song was suppressed by Napoleon, but in 1876 was adopted as the national hymn. The thrilling chorus is—

To arms, to arms, ye brave!
Th' avenging sword unsheathe!
March on, march on, all hearts resolved
On victory or death!

MARSEILLES, *mahr saylz',* the principal commercial port of France, if not of the entire Mediterranean Sea, second only to Paris in population among the cities of the republic. It is the chief town of the department of Bouches-du-Rhone, situated twenty-seven miles east of the mouth of the Rhone. The city is built in the form of an amphitheater, around a natural harbor of moderate size, known as the Old Harbor; a newer harbor, built about 1850, has a water area of 414 acres and a depth sufficient to accommodate the largest ocean vessels. Under normal conditions about 4,500 ships enter and clear the harbor each year. Despite its antiquity, Marseilles has no ancient monuments, but its population and commercial importance have rapidly increased. To-day it is a great, bustling city, as modern as any other metropolis.

Marseilles is a flourishing manufacturing center, working up the raw materials brought in by sea from all parts of the world. The principal manufactures include soap, steam engines and automobiles, oil, candles, macaroni, tiles and brick, and there are in addition sugar and petroleum refineries, lead, tin and copper plants, tanneries and flour mills. The city's memorable buildings include the Byzantine basilica, which serves as a cathedral; the pilgrimage church, Notre Dame de la Garde, with an image of the Virgin greatly venerated by sailors and fishermen; the museum of antiquities; and the Longchamp Palace, the latter a magnificent example of Renaissance architecture. The public institutions embrace a botanical and a zoölogical garden, a marine and astronomical observatory, libraries and schools of music, fine arts and medicine.

The first colony on the site of the city was founded by Phoenicians. Later, in 600 B.C., a party of Greeks from Asia Minor made a settlement there which they called Massilia. It was taken by Caesar in 49 B.C., and on the decline of the Roman empire became a prey to the Goths, Burgundians and Franks. During the tenth century it came under the dominion of the Counts of Provence, and for some centuries after it followed the fortunes of that house. During the French Revolution it was the scene of many stirring events, and it has given its name to that inspiring hymn of the Revolutionary era—*The Marseillaise* (which see). Population, 1911, 550,600.

MARSHAL, *mahr'shal,* a title of certain military and civil officers used in most civilized countries. The word, meaning *commander of the army,* was employed in England as early as the twelfth century. Marshals, or masters of horse, were appointed by early Frankish kings, and *marichal de France* eventually became the highest title in the French army; it was last borne by Joffre, the French hero of the War of the Nations. Camp marshals, from which the modern title *field-marshal* is derived, were introduced into the British army by George II in 1737; these had certain duties to perform, such as selecting camps and, with assistants, preserving order. The provost-marshal is still the highest military police officer. At the German court the *court-marshal* is an official of position and dignity, equivalent to the English lord chamberlain.

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The United States marshal is an officer of the Federal courts, his duties being to open and close the sessions of the district and circuit courts, and to serve the processes of the courts of his district. Deputy United States marshals make arrests for violation of Federal laws. There are United States marshals in each Federal judicial district of the Union, which means there may be more than one in each state, and this statement also includes Alaska, Hawaii, Porto Rico and the Philippines. They are appointed by the President, with consent of the Senate, for a period of four years.

Temporary police sworn in for special occasions are also called marshals, and in villages and small towns the chief police officer also receives this title.

MARSHALL, JOHN (1755-1835), is the most famous of the jurists who have served as Chief Justice of the United States Supreme Court, and his term of thirty-four years is the longest thus far in the history of the nation's highest tribunal. When John Jay, the first Chief Justice, resigned in 1795, he declared that the Supreme Court would never possess dignity and power because of the character of its organization. Chief Justice Marshall, by adopting new methods of procedure, gave the court the authority he believed it was intended it should exert, and by his masterly analysis of constitutional questions set a precedent for the interpretation of nearly every point of the Constitution as it existed before the War of Secession.

JOHN MARSHALL

Because of the far-reaching importance of his decisions during thirty-four years as Chief Justice of the United States Supreme Court he has been called the "second maker of the Constitution."

John Marshall was born on September 24, 1755, at Germantown, Va. On the outbreak of the Revolutionary War he gave up, for the time being, the law studies which were occupying his attention and became a volunteer in the patriot army. By 1777 he had risen to the rank of captain, and when, in 1781, he resigned his command, he had suffered at Valley Forge during the terrible winter of 1777-1778, and had taken an honored part in the battles of Brandywine, Germantown and Monmouth, and in the storming of Stony Point. During the greater part of the year 1780 he attended a course of lectures in law at William and Mary College, and the following year was admitted to the bar.

Between 1782 and 1787 Marshall was several times elected to the state legislature of Virginia, and in 1788 he was chosen a delegate to the state convention which adopted the Federal Constitution. In that assembly he and James Madison led the debate in favor of ratification. During the next few years his reputation as a lawyer constantly widened, and he was asked by President Washington to accept the position of Attorney-General of the United States. He declined this honor, but consented to go to Paris in 1797 with C. C. Pinckney and Elbridge Gerry to settle various questions arising from restrictions on American commerce. On his return to the United States he was elected to Congress, and in 1800 held for a brief period the office of Secretary of State in the Cabinet of President John Adams.

On January 31, 1801, Marshall began his epoch-making career as Chief Justice of the Supreme Court. Of the cases which came before the tribunal, and on which he rendered decisions, four in particular deserve mention. The first case involved the right of the Supreme Court to take cases on appeal from state courts; Marshall's decision settled for all time the supremacy of the national tribunal. A second decision established the principle that the power of state courts and legislatures cannot extend to institutions established by the national government when acting under powers granted by the Federal Constitution. The case in point was the result of a dispute between the Bank of the United States and the state of Maryland, the former having refused to pay a tax imposed by the state government. For the details of the most celebrated case which came before the Supreme Court during Marshall's term of office, see DARTMOUTH COLLEGE, subhead *Dartmouth College Case.* M.R.F.

Consult Magruder's *John Marshall;* Flanders' *Life of John Marshall.*

MARSHALL, THOMAS RILEY (1854-), an American lawyer, governor and Vice-President of the United States, in the administrations of President Woodrow Wilson. He was born at North Manchester, Ind., and attended Wabash College at Crawfordsville of the same state, from which he was graduated in 1873. Later he received degrees from Notre Dame and the University of Pennsylvania. At the age of

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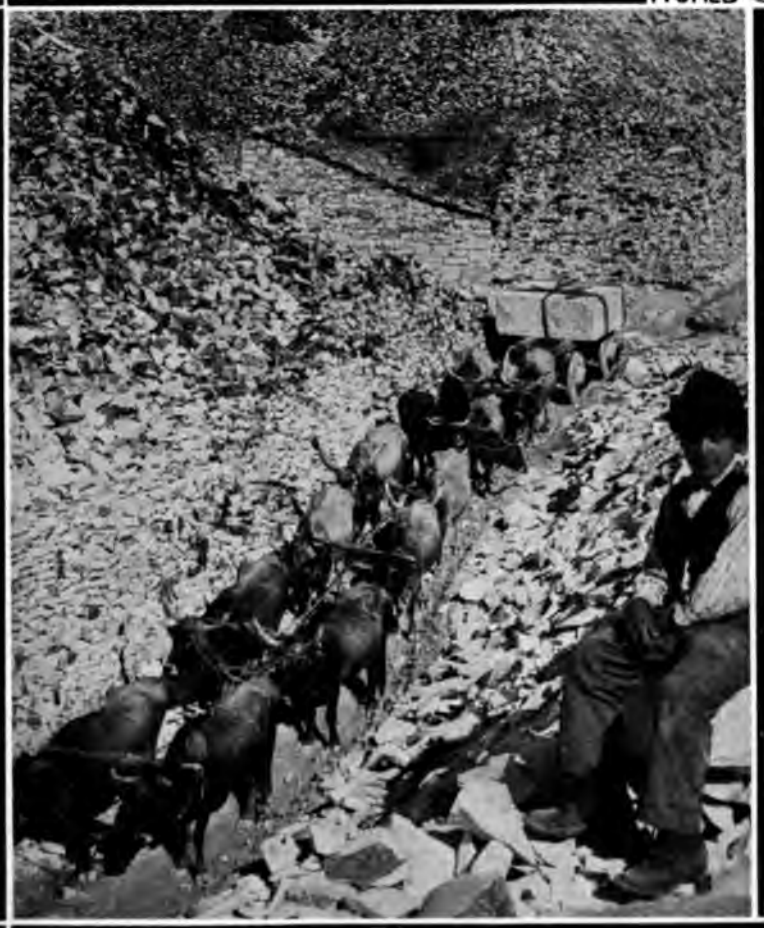

CARRARA MARBLE. Quarries at Carrara, Italy, which have been worked for 2,000 years. At left, hauling blocks to the village. At right, sawing slabs by hand. The workman can saw but four inches per day.

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IN FAMED CARRARA.

A present-day scene in the Italian village which was noted for its marble before the birth of Christ. Marble refuse gathered during twenty centuries.

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-one he was admitted to the bar and the practice of law in Columbia City, Ind.) the people of Indiana elected him gov- f the state; l and again 6 he was ed Vice- ent of the States. As er he was n for his sive elo- , and as a or for his ive ability ualities of hip. It was progressive fficient ad- ation while or of Indi- at brought him into national prominence d to his nomination as Vice-President.

THOMAS RILEY MARSHALL
The only man in the history of the United States who succeeded himself as Vice-President, with the exception of John Adams.

SHALL, Tex., the county seat of Harri- unty, situated in the northeastern corner state, near the eastern border line. port, La., is forty miles east, and Texar- is sixty-seven miles north. Transporta- provided by the Texas Pacific and the all & East Texas railroads. The city was d in 1840, was incorporated in 1843 and artered as a city in 1848. Since 1909 the ment has been administered on the com- n plan. In 1910 the population was 11,- n 1916 it was 13,712 (Federal estimate). rea of the city is nine square miles. ly cotton was the chief product of this a of the state, but within recent years tention has been paid to truck-farming the growing of fruit, especially peaches; y is the market for these products and abundant yield of the pine and oak of the vicinity. Stock raising is also ce of revenue for the city. The largest rial plants are the car and machine shops railroads serving the city; in these about n are employed. Various other estab- ts include a large cotton compress, a eed-oil mill and a pottery plant. Mar- s a fine courthouse and a city hall, and d operates its waterworks. Besides the hools it has Wiley University (Meth- iscopal), Bishop College (Baptist) for udents, and a Carnegie Library.

ALLTOWN, Iowa, the county seat ll County and a shipping point of importance in its territory. It is situated a little northeast of the geographical center of the state, one-half mile south of the Iowa River, fifty-nine miles west of Cedar Rapids and sixty miles northeast of Des Moines. The Minneapolis & Saint Louis, the Chicago & North Western and the Chicago & Great Western railways serve the city. Marshalltown was settled in 1851, was incorporated as a town in 1865 and received its charter as a city of the second class in 1868. It was named in honor of John Marshall, former Chief Justice of the United States. In 1911 the commission form of government was adopted. According to the Federal census the population, almost entirely American, increased from 13,374 in 1910 to 14,360 (estimate) in 1916; the state census of 1915 reported 16,065. The area is seven square miles.

Marshalltown is located in a rich agricultural and stock-raising section, and it ships large quantities of wheat and other grain; hogs and cattle are raised in the district and the city has extensive meat-packing establishments. There are also flour mills, grain elevators, canning and bottling works, carriage factories and a large glucose factory. About 1,400 people are engaged in over sixty industrial plants, which have an annual output of over $3,500,000. The machine shops of the Minneapolis & Saint Louis Railway are located here. Notable buildings are an $85,000 Federal building, erected in 1908, a $100,000 Y. M. C. A. building, a $110,000 Masonic Temple, a fine courthouse and the buildings of the Iowa Soldiers' Home, which cover about 160 acres. Besides its public school system, the city has Saint Mary's Institute and a Carnegie Library. Riverview Park (fifty acres) provides recreation for the people.

MARSH HAWK, or **HAR'RIER,** a migratory hawk of the north temperate zone. The male is nearly two feet in length, with dull blue-gray feathers; the females and the young are dark brown. The marsh hawk derives its name from its habit of haunting wet meadows and marshes, and of building its nest on swampy ground; it is sometimes called *harrier* because of its persistence in hunting its food. It is a long-winged bird, and capable of high, rapid flight, but usually skims along a few feet above a meadow watching for its prey—mice and frogs—which it can distinguish even in the twilight. The nest, a foot or more in diameter, contains four to six bluish-white eggs. See Hawk.

MARS, *mahrz,* **HILL,** a rocky hill in ancient Athens, lying west of the Acropolis. On the

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hill were held the meetings of the oldest justice court of the Athenians—the Areopagus (which see). Here, too, Paul preached the sermon recorded in *Acts* XVII. Authorities have never satisfactorily accounted for the name Mars Hill (or Hill of Ares), for the worship of the god of war was not connected with the hill.

MARSH MAL'LOW, a coarse herb of the mallow family, found growing in meadows and marshes in the north temperate zone. The stalks are woody and grow from two to three feet high; the leaves are large and broadly oval; both stalk and leaves are covered with a soft, downy hair. The pale pink flowers sometimes grow in the crotch between leaf and stem, but oftener in a cluster topping the stalk. It has a white, carrotlike root, which in times of famine has been used for food. This root yields glue and *demulcent,* or soothing medicine, but its most common use is as a basis for the candy also called marshmallow.

THE MARSH MALLOW

MARSTON MOOR, *mahrs'ton moor,* a plain in Yorkshire, England, about seven miles west of York, where the armies of King Charles I, under the leadership of Prince Rupert, were routed by Cromwell and Fairfax, July 2, 1644. This victory gave to Cromwell and the Parliamentary party the whole north of England, practically breaking the king's power. See CROMWELL, OLIVER, and other references there noted.

MARSUPIALS, *mahr su'pi alz* (from a Latin word meaning a *pouch* or *bag),* an order of mammals — *marsupialia* — remarkable for the fact that the females carry the young in an external pouch for some time after they are born. At one time animals of this order were found almost everywhere, but now they are limited almost entirely to America and Australia. The opossum is the only American representative. The kangaroo, wombat, bandicoot and Tasmanian wolf are Australian members of this group.

Although generally like other mammals, marsupials differ in the striking peculiarity which gives them their name. The young are born in an undeveloped state. The mother immediately places them in a pouch which is usually under the abdomen, and there they are cared for until fully developed. For some time after they a able to provide for themselves, however, th return to the mother's pouch for refuge wh frightened. Some marsupial animals live trees, others on the ground and a few in wat Some are meat-eaters, while others live only vegetable food; some eat insects only, a others live on every kind of food they c obtain.

Consult Parker and Haswell's *Textbook Zoölogy;* Scott's *History of Land Mammals the Western Hemisphere.*

Related Subjects. The student who wishes make a somewhat extended and systematic stu of this curious order of animals is referred the following articles:

Bandicoot	Opossum
Kangaroo	Tasmanian Wolf
Koala	Wombat

MARTEN, *mahr'ten,* a fur-bearing anim belonging to the same family as the sable; inhabits the northern parts of both the Easte and Western hemispheres. The best-know American species, called *American sable* a

THE PINE MARTEN

pine marten, once roamed through the f from Labrador to New Jersey, but it retr into the wilds as civilization advanced; still found in large numbers in the dense v of the Hudson Bay region. It is this s that for over two centuries has supplie most valuable fur for the American From November to March its rich brow is thick and soft, though sprinkled with black hairs, which are pulled out by t rier. During this season the marten h busiest, about 100,000 of the animal killed each year to supply the deman fur is made into coats, caps, muffs a and commands about the same price

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ı muffs sell for $65 and upward. ever, is much less expensive than see). Skunk fur is often treated arten.

mentioned above makes its home rocks or in tall trees, frequently for its use large woodpecker or . In summer it moves to low, s. It is about twenty-four inches g the bushy tail, which is from inches in length. Rabbits, squir- s and other birds, mice and nuts fare, and it has little to fear from s, the strong flavor of its flesh ful to most flesh-eating animals. ierican species, which is three feet the largest of the group, is called ıch-Canadian trappers, and *fisher* unters from across the border. European species are the *beech* or which has a white throat and *sweet* or *pine marten* (now rare), throat and chest is yellowish.

FUR TRADE.

n's *Life Histories of Northern Ani- Fur-Bearing Animals.*

VINEYARD, *vin'yard,* an island coast of Massachusetts, separated ıland by Vineyard Sound, which of from four to six miles. The ıe greater part of Dukes County, twenty miles long and ten miles th. It is low and mostly covered s a popular summer resort and cularly noted for its large camp e county seat is Edgartown, the towns being Fisbury, Gay Head, Cottage City; the permanent about 5,000. The island was dis- 12 by Bartholomew Gosnold.

mahr'shal (Marcus Valerius bout 40 - about 102), a famous ım writer, born at Bilbilis, in he went to Rome, and remained he favor of the emperors, espe- ın, until the year 98, when he ıis native city. Martial's fame teen books of epigrams, which the keenest wit the customs and ciety of his day.

LAW, or **MILITARY LAW.** rived from the Latin *martialis,* ı to Mars, the mythological god ial law is the extension of the o any community in which the r is unable to maintain public order, and it is exercised by the military power of the state or nation. It is government by armed force—legally employed—against unlawful operations that threaten to destroy society. Strikes, riots and the like may involve a locality in such strife that the safety of the people is endangered.

In a city, under such circumstances, the mayor would doubtless first call upon the county sheriff to aid his police force; if both proved ineffective, the governor of the state or province would be requested to send a sufficient force of militia to control the situation. Upon its arrival at the scene of trouble the military entirely succeeds the civil authority in all matters that conflict with it, but in other respects the civil control remains supreme; in his work of pacification the commander of the troops holds autocratic power over all citizens; for his actions in line of duty he cannot later be held to account, but for abuse of authority he and all connected with him may be treated as trespassers. In opposing unlawful acts and attempting to restore peace, it may be necessary to destroy property and even to sacrifice human life; the authorities are expected to apply the most rigorous measures to assure reëstablishment of order. The military arm of the government cannot succeed the local police power except by request of the latter; and military occupation must be withdrawn when local officials request it. The state bears the entire expense resulting from a call for troops to protect any community.

The executive authority of a state or country may call upon the nation's standing army to crush insurrection or repel invasion; the latter may declare martial law in the affected territory and apply the most stringent rules of war the occasion may require. The right to invoke martial law is recognized by every civilized country as being necessary to the preservation of law and order, but such action is never justified except in extreme instances, when local authority becomes admittedly helpless in the face of unlawful forces.

MAR'TIN, a name applied to several species of the swallow family. The *purple martin,* distinguished by the lustrous, purplish-blue color of the male, is widely distributed throughout North America. It is found as far north as the Saskatchewan valley, and winters in Central and South America. This bird builds its nest in a box, or attaches it to the eave of a house, and sometimes its home is in a decayed tree. It is grateful for any hospitality, will

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return year after year to prove its gratitude, and is usually a welcome guest on account of its services in driving away hawks and crows. Its flight is swift, easy and graceful. The eggs, four to six in number, are white and glossy, and two broods are reared in the season; it feeds on wasps, bees and beetles, which are swallowed whole. Several pairs will dwell in harmony in the same nest. There are other species of martin; among these are the *house martin* and the *sand martin,* both of which are smaller and less conspicuous in color than the purple martin. See SWALLOW.

MARTINIQUE, *mahr ti neek',* a French island belonging to the Lesser Antilles of the West Indies and lying almost midway between the two British islands of Dominica and Saint Lucia. The former is twenty-five miles to the north; the latter, twenty miles to the south. Martinique is roughly oval in shape; it is forty miles long and about twelve miles wide, and has an area of 380 square miles. From its rocky surface rise numerous volcanic mountains, the loftiest of which is Mount Pelée (4,430 feet), in the northwest. This mountain has become famous through its appalling eruption of 1902, which destroyed Saint Pièrre, then the largest city on the island, and caused the death of over 30,000 persons. Over a third of the island is under cultivation, the principal crop being sugar cane; coffee, cocoa, tobacco and cotton are grown to a limited extent.

Martinique was discovered by Columbus, some authorities placing the date at 1493, and others at 1502. Later it came into the possession of the French, who began to colonize it in 1635. The island was the birthplace of the Empress Josephine, wife of Napoleon Bonaparte. At the present time it is a French colony, and represented in the French Parliament by one senator and two deputies. Fort de France, capital of the colony of Martinique, has a population of about 27,000. Population of the entire island, 1913, 185,400.

MAR'TINSBURG, W. VA., is the county seat of Berkeley County, in the extreme northeastern part of the state. It is seventy-eight miles northwest of Washington, D. C., and seven miles west of the Potomac River, and is on the Baltimore & Ohio and the Cumberland Valley railroads. The area is nearly three square miles. The population, which in 1910 was 10,698, was 12,666 in 1916 (Federal estimate).

The city is situated in the lower Shenandoah Valley, protected by the Blue Ridge Mountains. In this fertile section are grown fruits, especially apples and peaches, and grains and garden truck. Horses, cattle, sheep, hogs and poultry are raised for the markets. The working of immense limestone and shale deposits is a growing industry. There are manufactures of flour, woolens and worsteds, hosiery, lumber, lime and wagons; canning factories, automobile works, cement plants and railroad repair shops are the chief industrial enterprises.

Martinsburg was settled before the War of Independence; it contains a Federal building, county courthouse, Y. M. C. A. and a city hospital and nurses' training school. D.H.B.

MAR'TIN'S FERRY, OHIO, a city of Belmont County, almost directly across the Ohio River from Wheeling, W. Va. It has steamboat and barge lines, and is on the Wheeling & Lake Erie, the Baltimore & Ohio and the Pennsylvania railroads and electric interurban lines. The population, nearly one-fourth foreign, in 1910 was 9,133; in 1916 it was 9,996 (Federal estimate).

Martin's Ferry is attractively located and has a Federal building erected in 1916 at a cost of $85,000, a public library and a hospital. There are iron and coal mines and limestone quarries in the vicinity. The industries of the city are steel mills, tin mills, a blast furnace, glass factory, sheet-steel rolling mills, metalware manufacturing plants, box and barrel factories, novelty mold works and a stove foundry and heater works. One of these concerns, among the largest of galvanized ware plants in the United States, employs 7,500 men.

A settlement, called Martinsville, was incorporated as a village in 1865. The name was later changed to Martin's Ferry, and the place became a city in 1885. A.J.F.

MARTYR, *mahr'tir,* the name applied to early Christians who suffered great persecution and even death rather than renounce their faith and trust in Christ. The number of martyrs reached into the thousands during the many periods when upheavals in the Church completely destroyed religious toleration. Stephen is regarded as the first Christian martyr, for he was seized and stoned to death by his fellow citizens for denouncing their wicked deeds (*Acts* VII, 59-60). Festivals in honor of martyrs were given as early as the second century, for they were greatly venerated by fellow believers, who often offered prayers at their tombs and thanked God for the example which they had given the world. In the old Roman calendar there was a feast in honor of all the mar-

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tyrs, which, in 731, was changed by Gregory III to include all saints.

MARX, *marks*, [HEINRICH] KARL (1818-1883), the founder of modern socialism, was born at Treves, Germany, of Jewish parentage. After completing his education at the universities of Bonn and Berlin, he became editor of a paper of liberal tendencies, published at Cologne. In 1843, shortly before this periodical was suppressed by the German government, he removed to Paris, where he came into close touch with a group of French socialists and assisted in editing one of their organs. The most potent influence in his life, however, was the friendship which he formed with Friedrich Engels, another German pioneer in socialism. Together they worked out a program known as the *Communist Manifesto*, which was issued in 1847 at a radical congress held in England. It advocated such revolutionary measures as a progressive income tax, abolition of inheritance rights, national control of railways and all means of communication, abolition of child labor in factories and free education in public schools.

Marx devoted the rest of his life to the work of spreading his socialistic views. This he did by means of his pen and through his genius for organization. In 1864 he realized the great ambition of his life when he united into one great league the laborers of the civilized world —the International Workingmen's Association. Five years later he helped to found in Germany the Social Democratic Labor party. The best exposition of his views on political economy is to be found in his *Das Kapital* (Capital). In this he asserts that all industries should be controlled by the state and not by individuals, a fundamental principle of socialism. See SOCIALISM.

Consult Aveling's *The Students' Marx;* Spargo's *Karl Marx, His Life and Work.*

MARY, the name of two queens famous in the history of England.

Mary I (1516-1558), queen of England and fourth sovereign of the Tudor line, is known as "Bloody Mary" because of the persecutions which she sanctioned in her determination to restore Roman Catholic worship to her realm. Over 300 persons were put to death, the most eminent of the martyrs being Cranmer, Ridley and Latimer. Mary, who was the daughter of Henry VIII and Catharine of Aragon, ascended the throne in 1553 on the death of Edward VI, after the unsuccessful attempt to set her aside in favor of Lady Jane Grey, "the nine-day queen." Her first measures were the repeal of all the religious statutes of Edward VI, and the revival of severe laws against heresy. Cardinal Pole was sent to England as the papal representative, and the kingdom formally restored to the Roman Church. She further displeased her subjects by her marriage to Philip II of Spain. Under his influence the queen waged a war with France resulting in the loss of Calais, which fell in 1558, after it had been in English hands over 200 years. This event was a source of deepest sorrow to the queen, who died shortly after.

MARY TUDOR

Mary II (1662-1694) was the eldest daughter of James II and Anna Hyde, the latter the daughter of the Earl of Clarendon. When she was fifteen years of age the Princess Mary became the wife of William, Prince of Orange, President of the Dutch Republic. When, by the "Glorious Revolution of 1688," James II was dethroned, the crown of England was accepted by William in accordance with his wife's claims to royal birth, and in response to an invitation from certain eminent nobles of the realm. In 1689 William and Mary were crowned joint sovereigns, with the understanding that the administration of affairs should be vested in the king. Mary, however, showed herself capable of acting with courage and good judgment when William was necessarily absent from England, and historians join in praising her for her unchanging loyalty to her husband. In her private life she was sincerely pious, modest and charitable. Five years after her accession she died of smallpox.

Consult Froude's *The Reign of Mary Tudor;* Rait's *Five Stuart Princesses.*

Related Subjects. The reader who desires further information as to the events of these reigns is referred to the following articles in these volumes:

Calais	James II
Catharine of Aragon	Latimer, Hugh
Cranmer, Thomas	Ridley, Nicholas
Grey, Lady Jane	William III
Henry VIII	

MARY, THE VIRGIN, the mother of Jesus, a daughter of a patrician family, who lived humbly and obscurely in Nazareth. In a stable at

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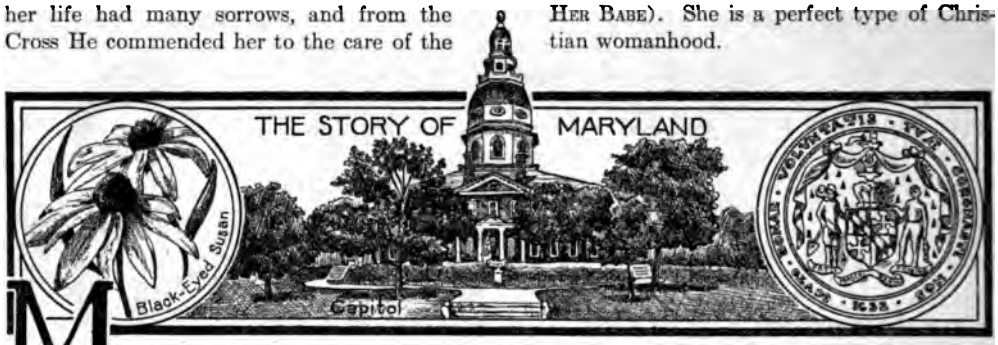
Bethlehem, where she had gone to be enroled in the House of David, according to the mode of taking the census, she gave birth to the Saviour. Through the sufferings of her Son, her life had many sorrows, and from the Cross He commended her to the care of the beloved disciple John. Little of her life has been recorded, and tradition says she died at Jerusalem in A. D. 63. In Christian art Mary occupies a prominent place (see MADONNA AND HER BABE). She is a perfect type of Christian womanhood.



MARYLAND, a South Atlantic state, one of the original thirteen states of the American Union, named in honor of Henrietta Maria, wife of the English king, Charles I. Maryland is popularly known as the OLD LINE STATE, the greatest part of its northern boundary being Mason and Dixon's Line.

Size and Location. Maryland lies for the most part between Pennsylvania and Virginia. Ranking forty-first among the states in area, it is about half the size of West Virginia and lacks 3,300 square miles of being half as large as New Brunswick. The water surface is 2,386 square miles, or over one-sixth of the total area of 12,327 square miles. Maryland's extreme breadth from north to south is 128 miles, on the east shore of Chesapeake Bay, while at Hancock, in the western end of the state, its breadth is but two miles. It is in form one of the most irregular states of the Union.

The People. In the number of inhabitants Maryland ranks twenty-seventh among the states, but in the density of its population it is exceeded by only six states. As compared with the average density of 30.9 per square mile for the United States in 1910, the population of Maryland averaged 130.3 per square mile. Of the 1,295,346 inhabitants in 1910, 232,250, or about 5.5 per cent, were colored, and 191,838 were foreign-born whites, principally Germans and Russians. The estimated population January 1, 1917, was 1,368,240. About 250,000 are negroes. The colored population of Baltimore is exceeded in only four other cities of the United States, namely, Washington, New York, New Orleans and Philadelphia. The urban population in the six cities of 2,500 or more in 1910 was 658,192, and the rural population numbered 637,154, or 49.2 per cent. Over two-fifths of the entire population of the state live in Baltimore, which city, with its estimated population of 589,621 in 1916, ranked seventh in size among the cities of the United States. Other chief cities are Annapolis, the capital; Cumberland, Hagerstown, Frederick and Cambridge.

The Roman Catholic and Methodist churches have the largest number of adherents. Other prominent denominations are the Episcopalians, Lutherans, Baptists and Presbyterians.

Education. The present system of common schools was put into effect in 1865, since which time a marked development and improvement have been noted. The illiteracy decreased from 19.3 per cent in 1800 to 11.1 per cent in 1900 and 7.2 per cent in 1910. At the head of the school system is the state board of education, under the direction of the state superintendent, who is appointed by the governor for four years. County commissioners are appointed by the governor for six years. In 1912 a compulsory school law was passed, the enforcement of which is left to the boards of the counties, except in the five whose representatives have exempted their counties. In 1914 five counties were enforcing this law, with an increase of ten to fifteen per cent in school attendance. A law providing for the consolidation of schools and the establishment of a state university was enacted in 1914.

Besides normal schools at Baltimore, Frostburg and Bowie, institutions for higher learning receiving state aid are Johns Hopkins University at Baltimore; Western Maryland College at Westminster; Washington College at Chestertown; Saint John's College at Annapolis; Maryland Agricultural College at College

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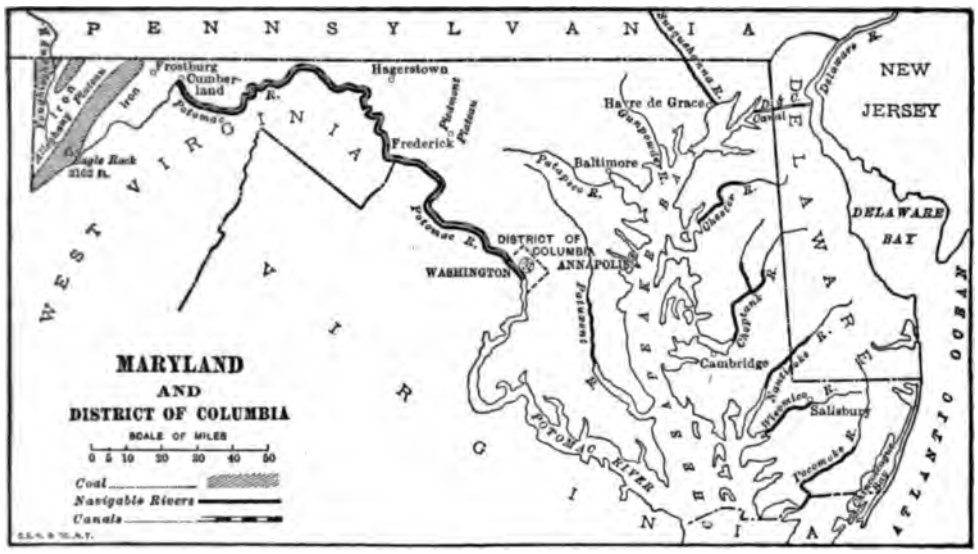

OUTLINE MAP

Showing boundaries, navigable rivers, principal cities, and the highest point of land in the state.

Park and Blue Ridge College at New Windsor. Other prominent institutions are Goucher and Hood colleges for women at Baltimore; Woman's College at Frederick; Maryland College for Women at Lutherville; Morgan College, a coeducational school for the colored at Baltimore, and Jacob Tome Institute, at Port Deposit. Conducted under the auspices of the Roman Catholic Church are Loyola College and Mount Saint Joseph College at Baltimore; Rock Hill College at Elliot City, and Mount Saint Mary's College at Emmetsburg. The United States naval training station is at Annapolis.

The Land. The diversified surface of the state may be divided into three distinct sections. These are the coastal plain, the Piedmont plateau and the Appalachian province.

The *coastal plain,* or *Tidewater Maryland,* occupying more than half the state, is divided in half by Chesapeake Bay, two-thirds of which lies in the state of Maryland. The bay is from ten to forty miles wide and is navigable by the largest ships. Its many arms and estuaries afford numerous and excellent harbors. The east shore is low and level, in few places, except at the extreme north end, rising more than twenty-five feet. The west coast is higher, rising to an elevation of 300 feet at Baltimore. Along the Atlantic border there is a long, reef-like sand beach enclosing shallow lagoons called Chincoteague and Sinepuxent bays.

The rivers flowing into the Atlantic are insignificant; most of the state is drained by the broad-mouthed rivers emptying into Chesapeake Bay. The largest of these are the Nanticoke, Choptank and Chester, on the east shore, and the Potomac, Susquehanna, Patuxent, Patapsco and Gunpowder, on the west shore. The northeast corner of the state is drained into Christian Creek and the extreme northwest section, towards the Ohio River.

The Piedmont plateau, extending forty miles from the Atlantic plain to Catoctin Mountain, is broken and hilly. The highest points are at Parr's Ridge, in Carroll County, and Sugar Loaf Mountain, which rises abruptly to an elevation of 1,281 feet. Between Parr's Ridge and Catoctin Mountain lies the level, fertile Frederick Valley, drained by the Monocacy River into the Potomac.

The Appalachian region is a succession of valleys and parallel, wooded mountain ridges extending from northeast to southwest. The Blue Ridge range, which rises 2,400 feet near the Pennsylvania line, crosses the state east of the Hagerstown valley. This range, together with North Mountain, lying west of Hagerstown valley, and the Alleghany ridge, between North Mountain and Cumberland, are the chief mountain chains. The highest point in the state is Eagle Rock, 3,162 feet, situated in the northwestern corner of the state, near the West Virginia boundary.

Climate. Owing to the diversity of its surface, Maryland has many varieties of climate. In the western mountainous region the winters are cold and the summers short and cool. In

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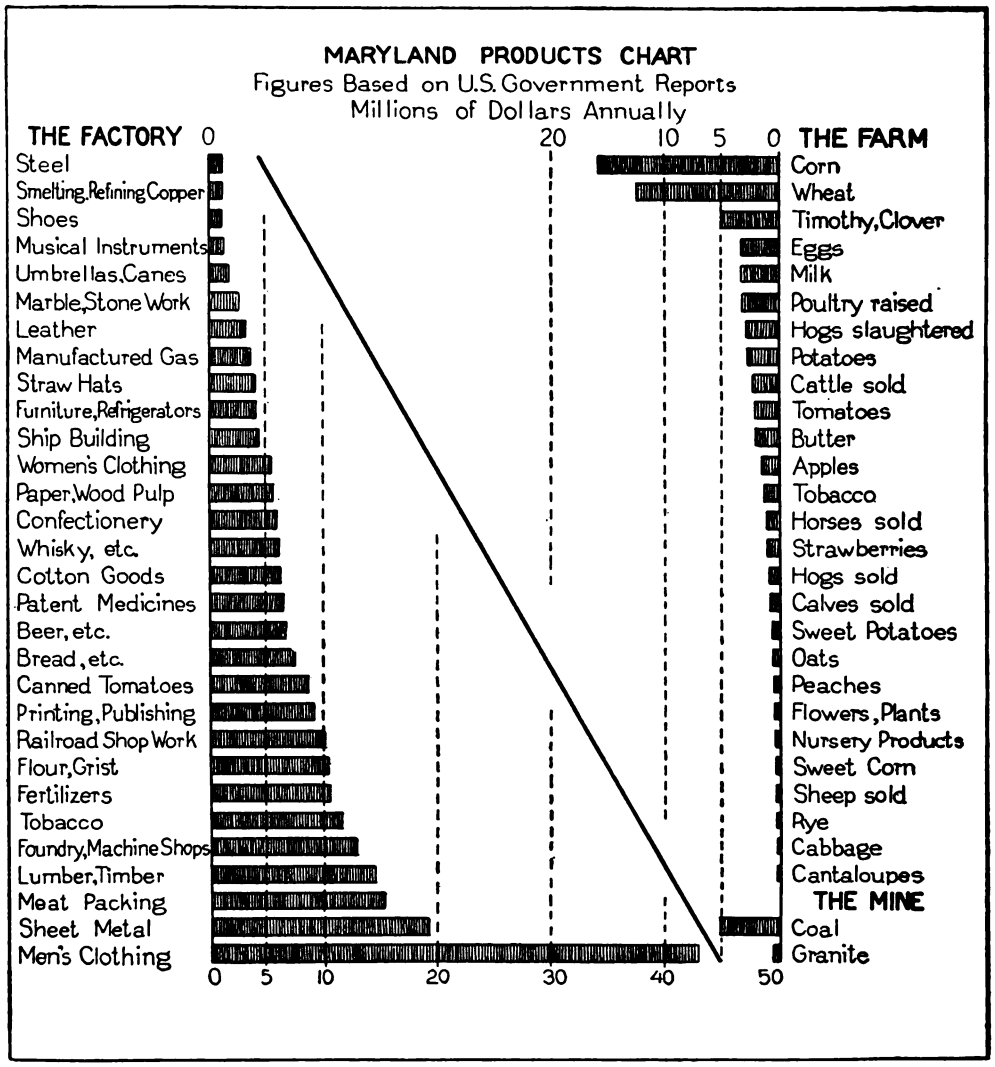

the south and east, the winters are mild and the summers hot. In these coastal sections, the growing season is a month longer than that of the mountainous region, which lasts only from April 15 to October 1. There are frequent changes and great daily ranges of temperature. In the north-central section, the temperature for July averages 75° F. and for January 30° F. The average annual temperature of the state is between 53° and 54°. On the western slope of the Alleghany plateau the rainfall is most abundant, averaging fifty-three inches per year. On the eastern slope of Parr's Ridge the average precipitation is forty-five inches. The valleys between Cumberland and Hagerstown have the least rainfall, the average amount being thirty to thirty-five inches, which is twelve inches less than that of the Atlantic plain.

Agriculture. One of the most distinguishing features of Maryland is its great variety of soil. In the light, warm, moist soil of the eastern shore many southern plants not common to the latitude of Maryland can be grown. A light, sandy, loamy soil, adapted to truck farming and the growing of vegetables and small fruits, is found in most of the coastal plain. In the southern part of the state the soil contains more clay and is better adapted to the culture of tobacco, large quantities of which are grown and exported. In Hagerstown valley and the Piedmont plateau the soil is heavy and better suited to general agriculture

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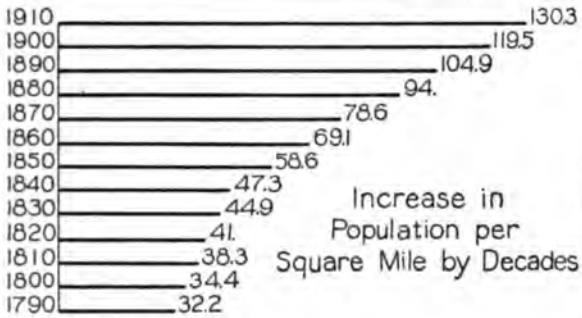
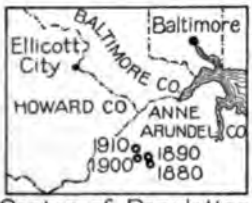
MARYLAND

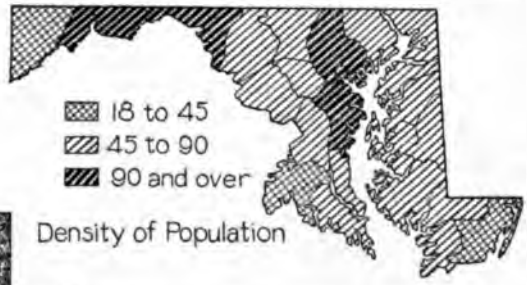


Increase in Population per Square Mile by Decades

Religions in the State

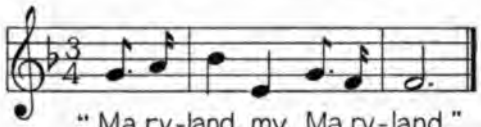


Center of Population



Density of Population

Old National Road and Tollhouse



"Ma ry-land, my Ma ry-land."

The Oyster Fleet in Chesapeake Bay

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than that of the coastal plain. Corn, wheat, hay and forage are grown extensively in this section. On the west slope of the Blue Ridge Mountains, the soil is peculiarly adapted to the growing of peaches. The principal fruit crop of the state is the apple, Anne Arundel County being the best apple-producing section. The most important of the small fruits is the strawberry. For many years Maryland produced more strawberries than any other state, but has recently been surpassed by three states, New York, California and Missouri.

The farm lands in 1910, occupying eighty-two per cent of the total area of the state, totaled 5,057,140 acres, of which 4,504,693 acres were owned or worked by white farmers. The farms average 103.4 acres in size and $32.32 per acre in value. The cultivation of flowers and nursery products is important, and beekeeping is extensive. The total value of crops is about $50,000,000 a year, of which fifty per cent is in corn and wheat.

The live-stock section of the state is in the central plateau region, Hagerstown valley and the central section of the east shore. Dairy farming and poultry raising are important branches of this industry. The dairy product exceeds $5,000,000 in yearly value, and the income from poultry products is even larger.

Minerals. By far the most important mineral product of Maryland is coal, most of which is mined in Garrett County and in the Cumberland field and George's Creek, in Alleghany County. The coal is of two kinds, bituminous (soft) and semibituminous. Most of the product is of the latter variety, which is the best quality found in the United States for the generation of steam and for blacksmithing purposes. The coal deposits, discovered in the Forestburg area in 1804, were not extensively worked until 1842, when railroad transportation was secured. Since the War of Secession the output has steadily increased, and for a number of years the average production has been about 4,000,000 long tons annually. Maryland usually ranks fourteenth among the states in coal production. The methods of mining are not modern, and ninety-five per cent of the coal is still mined by hand.

Clay-working and stone-quarrying are next in importance. The value of the clay products of the state is about $2,000,000 a year. Maryland is one of the few states which produce slate used in roofing. White marble is found in Baltimore County. Granite, limestone, sand, gravel and lime are other important products. The value of the mineral output including mineral waters is about $11,000,000 annually.

Fisheries. In proportion to Maryland's population, fishing is a more extensive occupation than in any other state of the Union. The sheltered waters of Chesapeake Bay and its shallow estuaries yield more oysters than are produced in any other state. The oyster product is nearly 6,000,000 bushels a year, valued at about $2,750,000, which is nearly seventy-five per cent of the entire fisheries output of the state. In the rivers, shad, soft and hard crabs, striped bass, perch, sturgeon and terrapin are caught in large quantities. In recent years, the value of Maryland's fisheries has decreased, falling from $6,460,759 in 1870 to $3,405,900 in 1914. In the latter year there were 8,400 fishermen and 1,100 fishing vessels in the state.

Manufactures. Since the early settlement of Maryland, manufacturing has been an important industry. The chief industry is the manufacture of men's clothing, in the production of which Maryland ranks fourth among the states. In 1914, with an output of manufactured goods valued at almost $377,000,000, more than $280 per capita, Maryland ranked fourteenth among the manufacturing states. The canning and preserving of fruits, vegetables, fish and oysters are important; Maryland produces almost half of the canned tomatoes used in the United States. Baltimore, ranking thirteenth among the manufacturing cities of the United States, is the chief industrial center. Cumberland, Hagerstown and Frederick are next in importance.

Transportation. Maryland has ample traffic facilities, both by land and by sea. The chief railroads are the Baltimore & Ohio, one of the first railroads of the United States; the Philadelphia, Baltimore & Washington; the Western Maryland; the Chesapeake & Atlantic; the Northern Central and the West Virginia & Pittsburgh lines. In 1914 there were 1,401 miles of steam railroad and 945 miles of electric railway in Maryland. The Chesapeake & Ohio Canal, which in 1850 opened navigation on the Potomac from Georgetown to Cumberland, now is used chiefly for the transportation of coal.

Unusual facilities for water transportation are afforded by Chesapeake Bay and the wide, navigable rivers. Thirty-three steamship lines enter Baltimore, which is one of the best ports of the Atlantic and which in 1914 ranked second in the exportation of grain and first in the export of coal. The Chesapeake & Delaware

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RESEARCH QUESTIONS ON MARYLAND

(An Outline suitable for Maryland will be found with the article "State.")

What is the dominating physical feature of that part of the state popularly known as "tidewater" Maryland?

How large a proportion of the area is in farm lands? How many farms of the average size for the state would this make?

In what important export does the chief port of this state rank first among the ports of the country?

What very important institution belonging to the Federal government is located in this state? Where is it?

In what agricultural product did Maryland long rank first? How does it now rank?

How does this state compare as regards railway mileage in proportion to area with Illinois? With Texas? With the country as a whole?

What is the "grandfather's clause," and what is its purpose? Why was not Maryland successful in its attempt to extend the scope of the law?

How is the compulsory school law enforced? What difference has the passing of that law made in school attendance?

Distinguish between the several varieties of soil in the different parts of the state, and tell what effect each has on agriculture.

Of what manufactured product does Maryland produce almost half of all that is used in the country?

Which are worth more, the entire crops of a year or the entire output of the manufacturing industries?

With what famous song is an event that happened on Maryland soil connected? Tell the story of the writing of this song.

What was the per cent of decrease in illiteracy during the nineteenth century?

How does it happen that the western part of the state, though removed from the influence of the ocean, has cooler summers than the eastern region?

Which are of greater value, the oyster fisheries of the state or all the other fisheries put together?

How many states had ratified the Federal Constitution before Maryland did so? How did this happen?

How does this state compare in density of population with New York? With Ontario? With the United States as a whole?

How high is the loftiest point in the state? How many states have a maximum altitude lower than this?

For whom was the chief city of Maryland named? What did he have to do with the history of the state?

What is Mason and Dixon's Line?

How many times as wide is Maryland at its widest point as at its narrowest? How many states are smaller?

What is the highest point in the Piedmont plateau region?

Why were not the coal deposits discovered in 1804 worked until nearly forty years later? For what is Maryland coal specially adapted?

For whom was this state named? Give its popular name and tell its origin.

What is a chief characteristic of the rivers that empty into Chesapeake Bay?

Which are more valuable, the dairy products or those of the poultry industry?

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Ship Canal, connecting Chesapeake Bay and the Delaware River, which in 1917 was being reconstructed by the Federal government, will further increase the advantages of water transportation.

With the building of the Baltimore & Ohio Railroad, the construction of the first telegraph in the United States, and the Chesapeake and Ohio Canal, Maryland led in the movement for internal improvements in the early part of the nineteenth century. Since 1900 the state has been more active than ever before in the improvement of its highways.

Government. Maryland has had four constitutions, adopted in 1776, 1851, 1864 and 1867. The present constitution, to which there have been sixteen amendments, provides that amendments may be enacted by vote of three-fifths of the members of the state legislature and the majority of qualified voters. The constitution may be changed by a constitutional convention called every twenty years.

The legislative department consists of a senate of twenty-seven members, serving four years, and a house of delegates, consisting of 102 members elected every two years. An unusual provision made during the early religious difficulties between the Roman Catholics and Protestants of Maryland prevents clergymen of any denomination from serving as senators or delegates. The general assembly meets the first Wednesday of January on the even-numbered years. Sessions are limited to ninety days. Maryland sends six representatives to Congress.

The executive department consists of the governor and attorney-general, elected by the people for four years, and a treasurer chosen by the legislature for two years.

Towns or cities may adopt the commission form of government, but at the close of 1916 Cumberland was the only city that had adopted this form. Workmen's compensation laws and provisions regulating the employment of children have been passed.

The judiciary consists of a court of appeals, circuit courts, orphans' courts and justices of the peace. The judges are elected by the people for fifteen years, or until they attain the age of seventy, when they must retire. Chief judges from seven circuits and a judge elected from the city of Baltimore, the eighth circuit, constitute the court of appeals.

Local administration is by counties. State institutions are in charge of a state board. These include schools for the blind and deaf at Baltimore and for the deaf at Frederick; hospitals for the insane at Sykesville and Spring Grove; a school for feeble-minded children at Owings Mills; an industrial and reform school for girls and one for boys at Baltimore; an industrial home for colored girls at Melvale. The state prison is at Baltimore; about half of the prisoners are negroes.

History. *Colonization.* The first settlement of white men in Maryland was a trading post established in 1631 on Kent's Island, by William Claiborne of Virginia. George Calvert, first Lord Baltimore, had obtained a grant from Charles I of the territory comprising the present states of Maryland and Delaware. This territory, intended as a refuge for Catholics, was in 1632 conferred by charter upon Cecilius Calvert, second Lord Baltimore. As proprietor, he was invested with sovereign powers, but he made no attempt to establish an absolute rule in the colony.

Early History. The peace of the colony was disturbed repeatedly by Claiborne, who refused to recognize Lord Baltimore, and by Virginian and English Protestants. The government was twice seized, but was restored definitely in 1715 to the fifth Lord Baltimore, a Protestant. Prosperity and peace were again disturbed by a boundary dispute with Pennsylvania, which was finally settled in 1767 by the establishment of the famous Mason and Dixon's line, which gave to the state its popular name.

Maryland took an important part in the French and Indian War. It was among the first colonies opposing the aggressions of England and took an important part in the Revolution. A constitution was adopted in November, 1776. Owing to her claims that the Northwest Territory belonged to the United States, Maryland refused to accept the national Constitution until after the passing of the Ordinance of 1787. On April 28, 1788, the state voted to adopt the Constitution of the United States, being the last of the thirteen colonies to do so.

Statehood. In the War of 1812 Maryland suffered from attacks made by the English fleet at Havre de Grace, Frederick, Baltimore and Fort McHenry. The last mentioned was the occasion of the writing of the *Star Spangled Banner,* by Francis Scott Key.

At the outbreak of the War of Secession Maryland, a border state, was torn by two great sympathies. Although a slaveholding state, the "Old Line State" did not secede, and its adherence to the Union doubtless saved Washington from falling to the Confederates.

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From the election of Lincoln until 1896 the state favored Democratic policies, and again in 1912, when President Wilson carried the state. In 1914 two Democratic senators were elected. In June, 1915, the statutes passed by the state legislature making the "grandfather clause" applicable to individual cities, thus restricting the negro vote, were declared unconstitutional by the United States Supreme Court. E.B.P.

Consult Brown's *Maryland*, in American Commonwealths Series; Richardson's *Sidelights on Maryland History*.

Related Subjects. The following articles in these volumes will furnish further information as to the geography and life of Maryland:

CITIES

Annapolis	Frederick
Baltimore	Hagerstown
Cumberland	

HISTORY

Baltimore, Lord	Grandfather's Clause
Barbara Frietchie	Mason and Dixon's Line
Claiborne's Rebellion	Ordinance of 1787

LEADING PRODUCTS AND INDUSTRIES

Apple	Peach
Coal	Poultry
Corn	Strawberry
Dairying	Tobacco
Fish	Wheat
Oyster	

WATERS

Chesapeake Bay	Susquehanna River
Potomac	

MARY MAGDALENE, *mag'da leen,* a devoted follower of Jesus, born in the village of Magdala, from which she received her name, to distinguish her from the other Marys of the Bible. She is first mentioned by Luke, who names her at the head of the list of Galilean women who seem to have accompanied their Master in most of his ministries. Mary was distinguished as one out of whom Jesus "had cast seven devils," so she was not only impelled to follow him through life, but she stood by the Cross at the Crucifixion and was also the first to look upon the risen Lord on the Resurrection morning. She was not "the woman who was a sinner," mentioned in *Luke* VII, 37.

MARY STU'ART (1542-1587), better known as MARY, QUEEN OF SCOTS, has been called "the most beautiful, the weakest, the most attractive and most attracted of women." Her life story is one of the tragedies of history. She was the daughter of James V of Scotland and Mary of Guise, who belonged to a powerful and noble French family. The princess was only a week old when her father died, but she was at once proclaimed queen of Scotland. At the age of six she was sent to France to be educated, and there, ten years later, she was married to the young French dauphin, who came to the throne in 1558 as Francis II. See DAUPHIN.

Soon after the death of her husband, in 1560, she returned to her native land and began her rule as queen of the Scottish people. Mary was devoted to Roman Catholicism, but she seems to have made no attempt at first to oppose the establishment of Protestantism in the country. In 1665, however, she married her cousin, Henry Stuart, famed as Lord Darnley, a young Roman Catholic nobleman whose rise to power was the signal for a revolt on the part of the powerful Protestant lords of Scotland. The rebellion was quickly suppressed, but in the meantime the queen discovered that she had married a worthless profligate whose coarseness and unrestrained ambition were equally distasteful to her.

MARY, QUEEN OF SCOTS

In March, 1566, Mary's private secretary, David Rizzio, was dragged from her supper room and murdered. Though Darnley was one of the leaders in the outrage, his wife fled with him to Dunbar. Two months later a son, the future James I of England, was born to them. As time passed by the queen and her husband became more and more estranged, and Mary began to show marked attention to James Hepburn, Earl of Bothwell. Early in 1567, Darnley fell ill and was taken by his wife to Edinburgh. On the morning of February 10 the house in which he was lodged was blown up by gunpowder and he was killed, a crime which everyone believed was instigated by Bothwell. Whether Mary had any part in it will never be known, but she became the wife of the Earl only three months after the murder. See BOTHWELL, JAMES HEPBURN.

The beautiful and misguided queen had made a fatal mistake. The lords of Scotland rose in arms against her, and in 1567 she was forced to abdicate in favor of her infant son. After remaining for nearly a year a prisoner on the island of Lochleven, she succeeded in making her escape and in raising a small army to defend her rights. The quick defeat of her forces

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having convinced her of the hopelessness of her position, she fled to England to entreat the protection of her cousin, the great Queen Elizabeth. The English queen, who saw in Mary a possible aspirant to the throne of England, kept her a prisoner for nineteen years. Finally she was accused of being one of the conspirators in a plot to assassinate Elizabeth, and though Mary steadfastly declared her innocence, she was found guilty and beheaded. The serenity and dignity with which she met her fate is beautifully described in Schiller's drama, *Maria Stuart,* which treats her life and character from a sympathetic viewpoint. B.M.W.

Consult Mumby's *Elizabeth and Mary Stuart;* Lang's *The Mystery of Mary Stuart.*

MASCAGNI, *mahs kahn' ye,* PIETRO (1863-), representative composer of the modern Italian school, whose opera, *Cavalleria Rusticana,* raised him in one night from utter poverty and obscurity to the height of fame. He was born at Leghorn, of humble parentage. Through the interest of an admirer, who early recognized his talent, Mascagni was enabled to enrol at the Milan Conservatory of Music; but he soon left his studies to begin a tour with an operatic troupe. Then began his struggles against poverty, for his income from teaching was very meager. Undaunted, however, he kept up the fight until the joyous news came, in 1891, that he had won the prize at Rome for his *Cavalleria Rusticana.* He later started on an operatic tour of America at the head of his own company. Although he has produced a number of other operas, *Ratcliff, L'Amico Fritz, Le Maschere, Iris* and others, none has approached his first success in merit or popularity.

MASE' FIELD, JOHN (1875-), an English "poet of the people," whose life has brought him into close touch with the poor and the unfortunate, and who writes of these experiences in an intensely realistic, sympathetic way. His works are "human documents"—pages out of the great book of everyday life.

JOHN MASEFIELD

Masefield was born on a farm in Ledbury, England. He ran away to sea when a boy of fourteen and voyaged all over the world, meeting with many fascinating adventures, upon which he has since drawn for his sketches, romances, and poems about the sea. Among these are *Salt-Water Ballads, A Mainsail Haul, Captain Margaret, The Story of a Round-House,* and *On the Spanish Main,* all of which have about them the spell of the sea. At one time he worked as porter in a Sixth Avenue saloon in New York. He has lived in the lowest slums of London, and has associated with men and women in nearly every walk of life. During the War of the Nations he devoted himself largely to Red Cross work, giving freely of money and personal service. The interest which American readers take in his writings was greatly enhanced by a series of lectures which he delivered in the United States and Canada in 1915-1916.

Masefield's poems are graphic pictures of human experience. They read more like interesting stories than poems, the narrative portions being put in the rough, vivid, everyday speech of the people whose story the poet is telling. Naturally, therefore, the language is sometimes coarse and irreverent; and this is a feature that many readers object to on the ground that it is out of place in poetry.

The Widow in the Bye Street, The Everlasting Mercy and *The Daffodil Fields* are among his best-known longer poems, telling, in verse that reads like a rhymed chant, pathetic tales of love and tragedy among the simple folk of Shropshire. His writings also include *Good Friday and Other Poems,* a collection of his later verse; *The Tragedy of Nan, Philip the King* and *The Tragedy of Pompey the Great,* dramas; and *Jim Davis,* a story for boys.

MASHONALAND, *ma sho' na land,* a province in the northeastern part of the British colony of Southern Rhodesia (see RHODESIA), in South Africa, between Matabeleland and the Zambezi River. Matabeleland and Mashonaland are the two political divisions of Southern Rhodesia. Mashonaland is a fertile river-watered plateau, high enough above sea level—2,000 to 3,000 feet—to be healthful for natives of temperate countries. It was formerly a rich gold territory, and gold is still found there. Though little is known of the early history of the land, extensive remains of temples, forts, altars, gold smelters, pottery, etc., found along the gold reefs, indicate that at one time a people of an advanced stage of civilization dwelt in Mashonaland. The natives, who are of the Bantu negro race, are peace-loving farm-

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ers, fond of music and skilled in pottery and gold work (see BANTU). Salisbury, the capital of Southern Rhodesia, is an important town of Mashonaland. In 1911 the native population was 495,450.

MASK, a disguise or covering for the face. It was first used among the ancient Greek peasants at their harvest festivals, when they wished to impersonate some one, and later at the ceremonies attending the worship of Dionysus or Bacchus. In modern times the only mask most widely used is the *domino,* or half mask, worn at costume balls and masquerades.

In Greek tragedy, which was an outgrowth of religious ceremonies, masks were used, and soon after they were introduced into comedy. Different characters wore them to represent such emotions as fear, hate, joy, love and sorrow. Often metallic mouthpieces were placed inside of the mask to increase the power of the voice, so that it could be heard in the large, open theaters.

Among certain groups of savages along the North Pacific coast of North America and in the islands of the south seas, masks made to look like hideous animals or mythological characters form a very important part in religious rites and dances. Other savages wear them to frighten away demons.

False Faces are pasteboard or cloth masks representing human faces, which are usually made as hideous as possible. To make these faces, a sculptor uses his moist modeling clay to form the features, and a hollow plaster of Paris cast is made of the model thus formed. Then pasteboard is soaked in water until it is soft and mushy, for in this condition it will fit into every curve and crack in the plaster mold. After the first layer has been carefully pressed upon the mold, another layer is added and then another, until it is thick enough to hold its shape firmly. Flour paste is used to hold the layers together. After the faces are dried, they are grotesquely covered with paint, and sometimes hair, mustache and whiskers are glued in their proper positions.

MASON AND DIXON'S LINE, in geography, the straight east-and-west line separating the states of Maryland and Pennsylvania; in history, an extension of that line roughly marked the division between slaveholding and free states before the War of Secession.

The geographic line was surveyed and marked by milestones between the years 1763 and 1767. This was done as a result of a controversy between the families of William Penn and of the Lords Baltimore, possessors of Pennsylvania and Maryland, respectively. The work was performed by two English surveyors, Charles Mason and Jeremiah Dixon, hence the name. All the milestones were marked on one side with an *M* for Maryland and on the other with *P* for Pennsylvania. Every fifth stone bore the arms of the two state owners. Through the years many of these stones were removed and used as doorsteps, curbstones, foundations and for other purposes. Later, controversies arose, but surveys made in 1849 and in 1900 showed no important error, and the line has remained at the parallel of 39° 43′ 26.3″ north latitude. Nearly all of the 500-pound milestones have been recovered and replaced.

MASON AND SLIDELL'. The names of James M. Mason and John Slidell are prominent in American history because of an episode that nearly involved the United States in hostilities with Great Britain, during the War of Secession. Late in the year 1861 they were appointed commissioners to England and France, respectively, by the Confederate government, and in October of that year sailed from Havana on the British steamer *Trent.* In November the vessel was stopped by the Union sloop of war, *San Jacinto,* in command of Captain Wilkes, who took Mason and Slidell as prisoners to Fort Warren, in Boston Harbor. The prompt disavowal of the act on the part of the Federal government and the release of the prisoners averted war between the United States and England (see TRENT AFFAIR, THE).

James Murray Mason (1798-1871) was born on Mason's Island, Fairfax County, Va. After his graduation from the University of Pennsylvania, in 1818, he began the practice of law in Winchester, Va., soon becoming prominent in the political life of his state. In 1837 he became a member of the national House of Representatives, and from 1847 to 1861 served in the Senate. The Fugitive Slave Law, introduced into the famous Compromise of 1850, was drafted by him (see COMPROMISE OF 1850). After the *Trent* affair he proceeded to England, but was unsuccessful in winning recognition for the Confederacy. Returning to America after the war, he lived in Canada until 1868, and from that date until his death, near Winchester, Va.

John Slidell (1793-1871) was born in New York City and educated at Columbia College (now Columbia University). Having removed to New Orleans in 1818, he served as United States district attorney for Louisiana from

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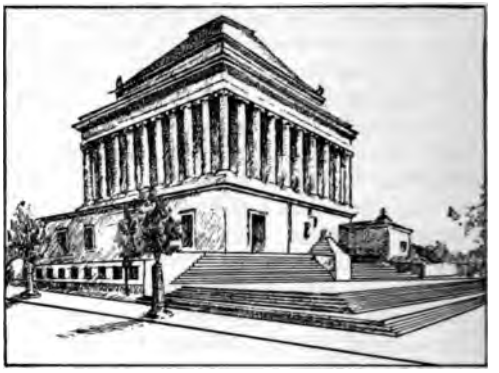
1829 to 1833, and from 1853 until the secession of Louisiana represented that state in the United States Senate. After his release from Fort Warren, he went to France, where he began negotiations for a loan to the Confederate government. At the close of the war he removed to England, where he remained the rest of his life.

MASON CITY, IOWA, a distributing point of importance and the county seat of Cerro Gordo County, is situated in the northern part of the state, midway between the eastern and western borders, on Lime Creek. Fort Dodge is seventy-two miles southwest and Des Moines, the state capital, is 115 miles south. Transportation facilities are provided by the Chicago & North Western, the Chicago Great Western, the Chicago, Milwaukee & Saint Paul, the Chicago, Rock Island & Pacific and the Minneapolis & Saint Louis railroads. An electric line extends westward. Mason City was settled in 1855. In 1913 the commission form of government was adopted. The population, which is steadily growing, increased from 11,230 in 1910 to 14,457 in 1916 (Federal estimate). Fourteen square miles comprise the city's area.

Owing to its shipping advantages, Mason City is the trade center and distributing point for an extensive agricultural and stock-raising section. The city has large wholesale houses and does a considerable business in grain, groceries and fruits. Valuable sandstone and fire clay are found in the vicinity, and the quarrying of sandstone and the manufacture of brick and tile are important industries. The city also produces gasoline engines and cement, and has a large packing house. Noteworthy features are the Odd Fellows' Orphans' Home, the courthouse and a public library.

MA'SONRY, or **FREE'MASONRY,** the largest and probably the oldest secret organization in the world. Of its true origin history tells nothing; many of its members claim that it was founded at the building of Solomon's Temple, but others declare it to be a product of the Middle Ages. It is known that in the thirteenth century, and perhaps earlier, the stone-workers of the British Isles and Western Europe were organized into guilds with the usual three degrees of master, journeyman and apprentice (see GUILD). Many large cathedrals were built in those days, and the masons traveled from town to town as their help was needed. In 1275 and in 1375 guilds of traveling masons had general assemblies in Frankfurt, and the fraternal organization there formed, with secret ceremonies and signs, may have been the beginning of the modern Masonic Order.

The modern organization of Free and Accepted Masons dates from the year 1717. Over a century earlier the British orders had admitted to membership others than actual masons, calling them *accepted* masons. The members who practiced the trade were termed *free,* for



MASONRY'S GREATEST TEMPLE
Headquarters of Scottish Rite Masonry, at Washington, D. C., completed in 1916. The building was fashioned after the famous tomb of Mausolus, accounted the fifth of the seven wonders of the ancient world (see MAUSOLEUM). The Washington Temple cost $2,000,000.

what reason no one really knows. After the era of cathedral building had passed, there had been a decline in the importance of masonry, and the revival of 1717 was brought about by *accepted* members, one of the most prominent being a clergyman. Four lodges met in London and formed the first Grand Lodge, and the three degrees which they instituted are still the basis of the Masonic Order. Any man who receives the first three degrees is as truly a Mason as he whose ambition carries him through the most exalted degree, the thirty-third, in the Scottish Rite (see below).

From this Grand Lodge of England have grown thousands of lodges, scattered throughout the world. Other degrees of initiation have been added to the original three, but there is no uniformity in their application. The Scottish Rite, which contains thirty-three degrees, was organized in Charleston, S. C., in 1801, based on rituals which had been developed in France. There are more than a million and a half Master Masons in the United States and about one hundred thousand in Canada.

The Masonic Degrees. The various steps in Masonry can be explained briefly after the following plan. The letter "Y" may represent the basis of the Order and its branches: The stem of the letter may stand for the first three de-

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grees—all there is or ever was of Ancient Craft Masonry—the so-called Blue Lodge, whose three degrees are—

1. Entered Apprentice
2. Fellowcraft
3. Master Mason

But Masonry invites its members to seek further light in the Order. That they may receive it two ways have been prepared for them, and any Master Mason may choose either one or both of them. These are called the York, or American Rite, and the Scottish Rite. Should the candidate elect the York Rite he would climb by one of the forks of the Y; should he prefer the Scottish Rite he would follow the other fork. In either direction he would eventually reach the thirty-second degree, and be eligible for the great social club known as the Mystic Shrine.

[The Shrine is not *Masonry;* it is not a Masonic institution, nor is it recognized by any Grand Lodge. It is simply a social organization.]

If the candidate elects the York Rite his progress through the degrees in the *Chapter* is as follows:

4. Mark Master
5. Past Master
6. Most Excellent Master
7. Royal Arch Mason

He may then enter the *Council of Royal and Select Masters* and receive two degrees:

8. Royal Master
9. Select Master

Following the Council comes the *Commandery of Knights Templars,* with three degrees:

10. Red Cross Knight
11. Knight of Malta
12. Knight Templar

The preceding steps include all of the York Rite. A candidate wishing to ascend by the Scottish Rite applies for membership in a *Lodge of Perfection,* where the following degrees are conferred:

4. Secret Master
5. Perfect Master
6. Intimate Secretary
7. Provost and Judge
8. Intendant of the Building
9. Elu of the Nine
10. Elu of the Fifteen
11. Elu of the Twelve
12. Master Architect
13. Royal Arch of Solomon
14. Perfect Elu

If the candidate elects to travel farther on the road, he takes four degrees in *Chapter Rose Croix:*

15. Knight of the East
16. Prince of Jerusalem
17. Knight of the East and West
18. Knight of the Rose Croix

The next step is the *Council of Kadosh,* with twelve degrees:

19. Pontiff
20. Master of the Symbolic Lodge
21. Noachite, or Prussian Knight
22. Knight of the Royal Axe, or Prince of Libanus
23. Chief of the Tabernacle
24. Prince of the Tabernacle
25. Knight of the Brazen Serpent
26. Prince of Mercy
27. Knight Commander
28. Knight of Sun, or Prince Adept
29. Scottish Knight of Saint Andrew
30. Prince Kadosh

Following the above is the *Consistory,* with two degrees:

31. Inspector Inquisitor
32. Master of the Royal Secret

The seeker after Masonic light who has gone thus far has received all the degrees that most men can obtain. There is but one more degree:

33. Inspector General

This latter degree is of the *Supreme Council.* It cannot, like the others, be obtained upon application and by the payment of a fee. It is conferred upon a very limited number and then only as a special appreciation of work in the Masonic bodies, and the aspirant for the honor must be recommended. E.D.F.

MASQUE, *mask,* a form of dramatic entertainment named from the masks which the performers wore. At its introduction, in the time of Henry VIII, it was little more than a pageant or spectacle, but dramatic features were added, music was given a greater part, and very elaborate, fanciful plots were worked out. These performances were given privately more often than on the stage, and particularly at court, where the chief nobles with their ladies took part. No expense was spared, and the greatest artists were employed in the staging of these miniature plays. Perhaps of all who wrote masques Ben Jonson appreciated most thoroughly the limitations and the demands of that special form of drama, and those of his which remain are charming in plan and in execution alike. Milton's *Comus,* one of the most famous masques ever written, was produced during the reign of Charles I, when the popularity of such productions was declining. Exquisite as this is, it is designed to be read rather than to be acted, and the same has been true of most masques written since that time.

MASS, in the Roman Catholic Church, the celebration of the sacrifice of the Eucharist, commemorating the passion or suffering and death of Christ. There are four principal parts in a mass, the gospel, the offertory, the conse-

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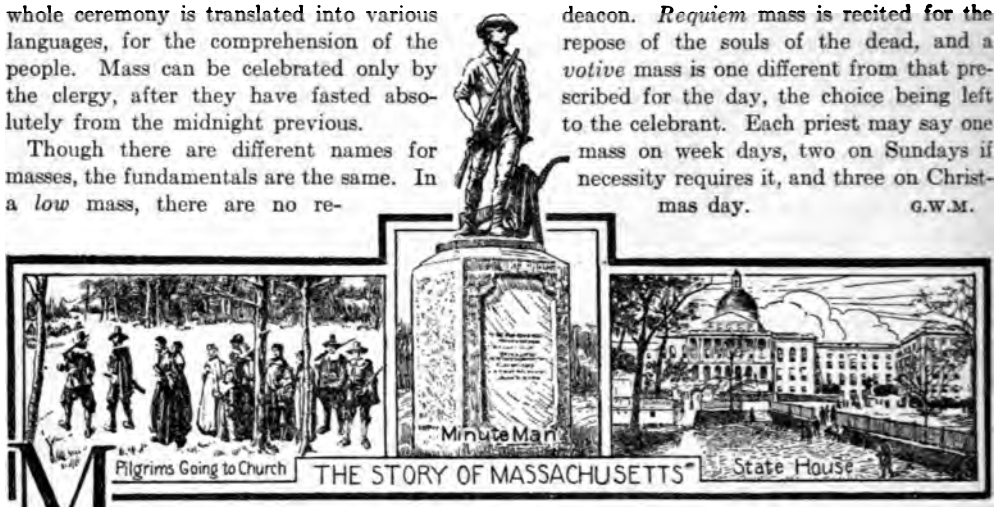
cration and the communion. Besides these, there are several smaller parts, each symbolic of some episode in Christ's life, during the days immediately preceding its close. The mass is read, or sung, in Latin by the celebrant, but the whole ceremony is translated into various languages, for the comprehension of the people. Mass can be celebrated only by the clergy, after they have fasted absolutely from the midnight previous.

Though there are different names for masses, the fundamentals are the same. In a *low* mass, there are no responses from the choir; at *high* mass the responses are sung by the choristers, usually with instrumental accompaniment; a *solemn high* mass is the same as a high mass, except that the celebrant is attended by a deacon and subdeacon. *Requiem* mass is recited for the repose of the souls of the dead, and a *votive* mass is one different from that prescribed for the day, the choice being left to the celebrant. Each priest may say one mass on week days, two on Sundays if necessity requires it, and three on Christmas day. G.W.M.



MASSACHUSETTS, *mas a chu' sets,* one of the thirteen original states of the American Union, perhaps the foremost among the colonies in the formation of that Union. It is a little state, only four out of the forty-eight ranking below it in size, but no state has had a more romantic history or one of greater importance to the country. Its name, obviously Indian in origin, and meaning *near the great hills,* was borne by a tribe of Indians who lived in the region before the coming of the white man, while the popular name, *Old Bay State,* has reference to the great bay on which Boston is situated.

Location and Size. Massachusetts is a North Atlantic state, one of the famous group known as New England. A large part of it is less than a degree in width from north to south, lying between 42° and 42° 43′ north, but to the east the state widens considerably, so it has with its capes and peninsulas an Atlantic coast line of more than 250 miles. Its farthest point north is 114 miles from its extreme southern point. From east to west its greatest length is 184 miles, and it has an area of 8,266 square miles, of which 227 square miles are water surface.

The People. This little state is exceeded by but five states in number of inhabitants, possessing in 1915 a population of 3,693,310. In density of population it is surpassed only by Rhode Island, for it has an average of 459.4 people to the square mile. The population, with the exception of 40,000 negroes, is almost equally divided among native-born whites with native-born parents, native whites with foreign or mixed parents, and foreign-born people, each class making up a little more than thirty per cent of the population. This state, with its coastal location and its thriving industries, has offered a very attractive field to immigrants. Among the foreign-born inhabitants the Irish are most numerous, and Canadians rank second.

No other state, whatever its size, has so many good-sized towns as Massachusetts, which at the census in 1915 showed no fewer than seventy-two with a population over 8,000; while over ninety per cent of the inhabitants live in cities of 2,500 or more. Boston, the capital and chief manufacturing center, is the largest city; others of importance, in the order of their size, are Worcester, Fall River, New Bedford, Cambridge, Lowell, Springfield, Lynn, Lawrence, Somerville, Brockton and Holyoke. All of these, and others, are given separate treatment in these volumes.

A Literary Center. Any account of its people would fail to do justice to the large place which Massachusetts has held in the life of the United States if it took no notice of the intellectual activities in which the state has always been preëminent. It is to the permanent fame of Massachusetts that it includes among its great writers Bryant, Longfellow, Lowell, Whittier, Holmes, Franklin, Emerson, Prescott, Mot-

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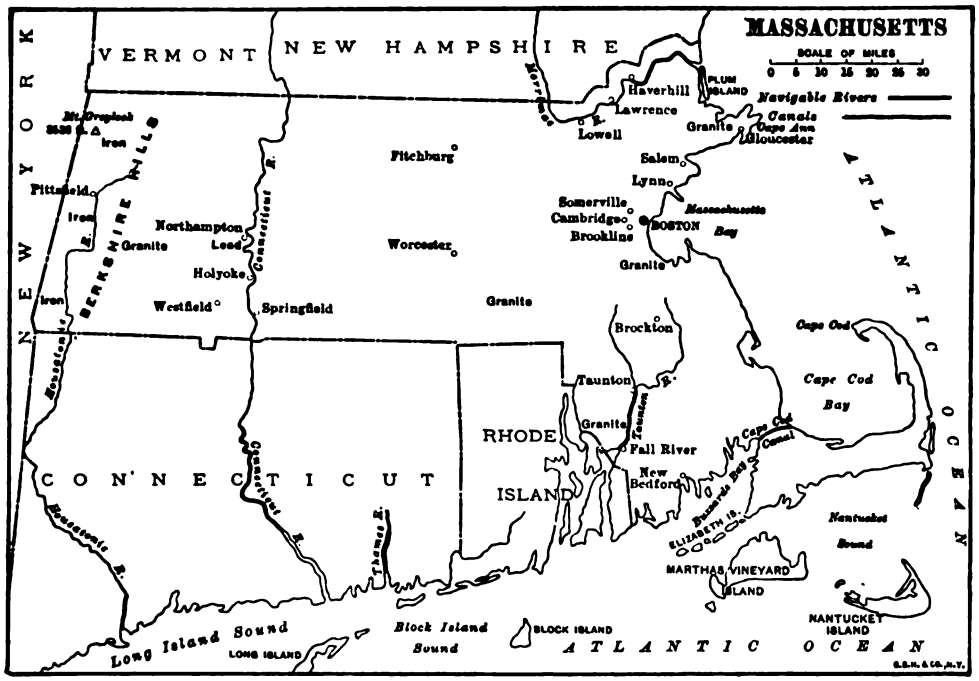

OUTLINE MAP OF MASSACHUSETTS

Showing the boundaries of the state, the navigable rivers, principal cities, location of minerals, quarrying centers, and the highest point of land in the state.

ley, Parkman, Mann, Phillips, Hawthorne, Mrs. Stowe, not to mention many of scarcely inferior fame. Their part in the history of America has been little less important than the services of Massachusetts statesmen, foremost among whom were John Adams, John Quincy Adams and Daniel Webster.

Coast and Surface. The sea coast is very irregular, and is dotted with scores of islands, many of them very small, but some, as Nantucket, Martha's Vineyard and the Elizabeth Islands, of considerable size. There are numerous excellent harbors, Boston ranking first, and New Bedford, on Buzzard's Bay, second, but there is a long stretch of low coast with many "spits" of sand stretching south from Boston and all along the Cape Cod peninsula, and here good ports are few. To the north of Boston the shore line is rocky and picturesque, and there most of the harbors are to be found. The most conspicuous feature of the coast region is the peninsula of Cape Cod, which juts into the sea like a long arm bent at the elbow, thirty-five miles from shoulder to elbow and thirty from elbow to hand.

All of this eastern section is low and level, with a gradual, undulating rise toward the west and northwest; the rest of the state is divided into three chief surface regions. Just west of this sandy lowland is a plateau about 1,100 feet in height—a beautiful region with stream-carved valleys and low, rounded hills. Then comes the Connecticut Valley, broad and fertile, from the level of which rise here and there hills which reach a height of 1,200 feet or more. Mount Tom, Mount Holyoke and other lower peaks are particularly interesting to the geologist because they show so clearly how the occasional streaks of hard rock resisted when the river was cutting its valley through the soft shales and sandstones (see EROSION). In the extreme west is the Berkshire country, one of the loveliest regions in the United States, crossed from north to south by extensions of the Green Mountains known as the Berkshire Hills. Long hill ridges, wooded to the top, are intersected by deep valleys in which lie so many clear blue lakes that the section is called the Lake Region of America. The summits present a remarkably even sky line, but some of them rise far above their fellows, Saddle Mountain, or Greylock, in the northern part of the state, reaching a height of 3,538 feet, the highest point in Massachusetts. This beautiful scenic section is a favorite resort region, and has many little villages which in the winter are shut away from

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the world by snow and impassable roads, but in the summer overflow with visitors.

Rivers. Massachusetts is well drained by its many rivers, the chief of which is the Connecticut, which flows in a north and south direction across the state. Its most important tributaries are, from the east, Millers and the Chicopee, and from the west the Deerfield and the Westfield. In the northeast is the Merrimac, which has a course of but thirty-five miles within the state but receives the waters of the Concord and the Nashua. Other rivers of importance are the Housatonic, famous for its picturesque scenery, the Hoosac, which flows northwestward into the Hudson; the Charles, with its literary and historic associations; the Taunton and the Blackstone. Few of these rivers, flowing through their deep, wide valleys, are fitted for navigation, so broken are they by falls and rapids, but this does not mean that they are of no importance industrially. Indeed, Massachusetts owes its manufacturing supremacy largely to its rivers, for they furnish unlimited water power; and the chief fall lines in the different rivers are marked by the location of such industrial cities as Lowell, Haverhill, Waltham and Lawrence. See FALL LINE.

Climate. Mark Twain declared that the climate of New England was made and managed by one of Nature's unskilful journeymen, so changeable and unsettled is it; and Massachusetts has its full share of this journeyman weather. Extremes of heat and cold are great, the changes in temperature are often very abrupt, and spring is frequently almost nonexistent. In the mountainous region to the west the winters are likely to be very severe, but farther east the ocean exercises a tempering influence. Autumn is the pleasantest season, and is often very beautiful, especially in the hill country. Rainfall is everywhere plentiful, ranging from forty to forty-five inches a year.

Resources and Industries. *Minerals.* The one great mineral product of Massachusetts is granite, in which for many years it was the leading state. In recent years, however, Vermont surpasses it, though its yield is still valued at more than $2,000,000 a year. Other building-stones, of which the most important is the brown sandstone found in the Connecticut Valley; limestone, used chiefly in the manufacture of large quantities of lime; excellent clay; emery, of which the state is one of the chief producers; and such minor products as fuller's earth, feldspar and iron pyrites, make up the remainder of the mineral output of Massachusetts.

Fisheries. These have been of importance since the very beginning of the colony, and today the product of the fisheries of Massachusetts exceeds that of any other state. Whales are no longer captured off Nantucket Island, as in the olden days, but all along the coast there are towns whose sole industry is fishing. Chief of these is Gloucester.

> Scattering wide, or blown in ranks,
> Yellow and white and brown,
> Boats and boats from the fishing banks
> Come home to Gloucester town,

wrote William Vaughn Moody; for there are regular fleets of fishing boats, which do not merely hover about the home coast, but set sail for the Grand Banks of Newfoundland and bring home vast stores of cod and mackerel. Life on these fishing boats and in the fishing villages is one of the most characteristic forms of New England life, and such books as Kipling's *Captains Courageous* owe their charm to their graphic pictures of it.

Besides the two varieties of fish mentioned above the most valuable kinds taken are haddock, halibut, herring, hake, lobsters and pollack, while on the southern coast there are extensive oyster beds. The station which the United States Fish Commission maintains at Woods Hole, on Buzzard's Bay, is important.

Agriculture. Much has been said and written in recent years of the exhausted farms of New England; indeed, the soil of Massachusetts, except in a few of the river valleys, is not very fertile. The hillsides are stony and overgrown with trees, and only about forty per cent of the area of the state is actually improved farm land. Agriculture, therefore, that industry to which the earliest colonists turned for their very existence, is no longer of prime importance to the state. Formerly cereals were raised in considerable quantities, but Massachusetts no longer tries to compete with the great wheat and corn-growing states to the west. However, the large number of cities in the state makes one thing very desirable—that plenty of vegetables, poultry, fruit and dairy products be produced to supply the cities; and the carefully-cultivated truck farms are perhaps the most valuable agricultural land in the state. Many kinds of orchard fruits, especially apples, grow very well, and small fruits are grown in abundance. A very characteristic industry is the growing of cranberries on the marshy lands of Cape Cod and its vicinity; another of historic interest is the raising of tobacco in the Connecticut Valley, which was carried on in colonial days.

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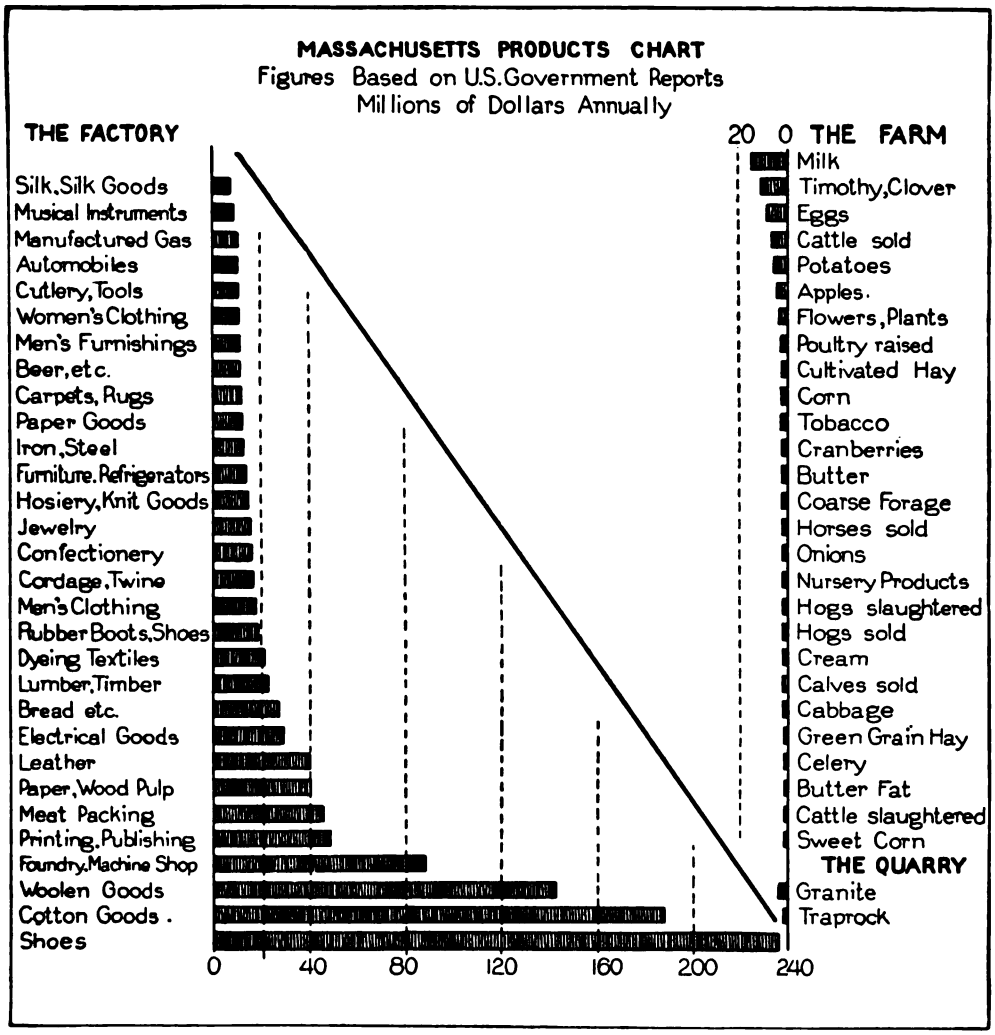

Manufacturing. This is the great industry of the state, which owes most of its mills and factories, as stated above, to its ready supply of water power. Only New York, Pennsylvania and Illinois produce manufactured goods in greater amount, and in a number of important branches of industry Massachusetts is easily first. For instance, no other state compares with it in the manufacture of boots and shoes, more than a hundred million pairs coming from its factories every year, to say nothing of the vast amount of accessories and cut stock. Almost half of the footwear made in the United States is produced in Massachusetts. Of even greater importance than boot and shoe making are the combined cotton and woolen industries, which produce in a year goods valued at almost $400,000,000. Massachusetts leads all the states in the production of cotton, woolen, worsted and felt goods, stands high in the list of producers of carpets, rugs and silks, and makes more cordage and twine than any other state. Near to these in importance are the manufacture of foundry and machine-shop products, printing and publishing, meat packing, and the making of leather goods and of wood pulp.

Many of the industries are rather sharply localized, though Boston, by far the largest manufacturing center in the state, exhibits wide variety. Lawrence, the second city in the value of its manufactures, ranks foremost among the cities of the United States in the production of woolen and worsted goods; Fall River, Lowell and New Bedford make more cotton goods than any other cities in the country; Lynn, Brockton and Haverhill are the great centers of the

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boot and shoe industry; the paper mills of Holyoke are famous the world over for the fine quality of writing paper and book paper which they produce; and Waltham has one of the largest watch factories in the world. In fact, cities which are not manufacturing centers are almost unknown in Massachusetts, and many of the smaller towns owe their existence to their industries.

Transportation and Commerce. Massachusetts was a pioneer in railway-building, the very first track ever laid in the United States having been one for the so-called Quincy Railroad, over which granite was carried for the Bunker Hill Monument. The first steam railroad in the state, however was not begun until eight years later, in 1835. The great industrial development of the state has made necessary good transportation facilities, and to-day only New Jersey has a larger mileage per 100 square miles of territory. Boston is the chief railroad center, and most of the lines converge there, connecting practically all of the cities of the state more or less directly with the capital and industrial center. Electric railways have increased rapidly, and at present their total mileage, over 3,000, is about fifty per cent greater than that of the steam railroads. The highway commission of the state is very active, and roads are for the most part excellently kept up. The annual appropriations make provision for the planting of roadside trees.

The commerce, which is very extensive, centers in Boston, second only to New York in importance among Atlantic seaports. One of the first things the early settlers did, when towns began to spring up along the shore, was to establish a coastwise trade, and this grew and expanded until to-day Boston has direct steamship connection not only with other United States ports, but with the leading ports of Europe as well. Much that is sent out from the state is goods received for foreign shipment from other parts of the country, but large quantities of manufactured goods and fish are shipped, as well. The imports, which consist largely of such raw materials as wool, cotton, jute, leather and cereals, surpass the exports.

The Cape Cod Canal, opened on July 29, 1914, brings Boston into closer touch with the ports south of Cape Cod; for it not only shortens the distance by seventy miles, but makes the voyage far less dangerous. See CAPE COD CANAL.

Education. Massachusetts has the proud distinction of having established the first free school and the first college in the Western hemisphere. Interest in education has never lagged since those early days, and to-day the school system ranks among the very best in the world. If the state did not have such a large foreign-born population its illiteracy percentage would be the lowest in the United States, for of the native-born inhabitants ten years of age and over, only four-tenths of one per cent cannot read and write. Counting in the foreign-born population, the total illiteracy percentage is 5.2.

At the head of the system is a board of education, and not only Massachusetts, but every other state in the Union as well owes much to Horace Mann, the very first secretary the board ever had (see MANN, HORACE). Taxation provides for most of the expenses, but needy towns which cannot thus support their schools receive aid from the interest on the state school fund. Each town which has a certain amount of taxable property must employ a skilled superintendent, and smaller towns must belong to superintendency unions, which receive help from the state in the payment of the superintendent's salary. Towns which have at least 500 families must maintain a public high school, and there are at present in the state 270 of these secondary institutions, with an average of ten teachers to each. There are also night schools in large number, continuation schools for children who must work, and ten state normal schools, but there is no state university. Massachusetts has, however, an unusual number of such higher institutions of first rank, chief among them being Harvard University, the oldest college in the United States; Amherst College, Boston University, Williams College, Tufts College, Clark University, Massachusetts Institute of Technology, the College of the Holy Cross and Boston College. Especially for women are Radcliffe College, closely allied with Harvard; Mount Holyoke College, Wellesley College, Smith College and Simmons College. In addition there are many academies and technical and professional schools.

Religion. Until the middle of the nineteenth century, Massachusetts had a comparatively small proportion of Roman Catholics, but the Irish and the French Canadians who flocked to the state changed the religious condition, so now the Roman Catholics far outnumber all the Protestant denominations combined. Only two states in the Union have a larger proportion of Catholics to population. Of the Protestant sects, all of which are well represented, the strongest are the Congregationalists, and this

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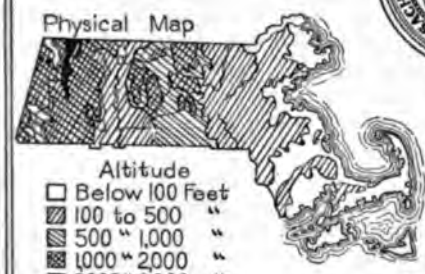
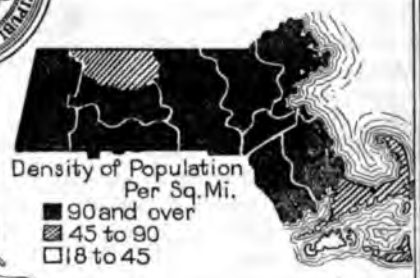
MASSACHUSETTS

State Seal





Saint-Gaudens "The Puritan"
(in Springfield)

419	1910
349	1900
278	1890
222	1880
181	1870
153	1860
124	1850
92	1840
76	1830
65	1820
59	1810
52	1800
47	1790

Increase in Population Per Sq. Mi.

John Harvard Statue
Cambridge

The Old State House
Boston

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seems but natural, since in the old days Massachusetts was a strictly Congregational colony. The state has also been the center of the Christian Science movement.

Charitable and Penal Institutions. At the head of the charities is the state board of charities, which has wider powers than similar boards in most other states. Among the institutions over which they have control are the hospitals for the insane, at Danvers, Medford, Northampton, Taunton, Westboro and Worcester; the school for the feeble-minded, at Waltham; the hospital school for crippled children, at Canton; the infirmary, at Tewksbury; four state sanatoriums, at North Reading, Rutland, Lakeville and Wakefield; the hospital for epileptics, at Monson, and for lepers, on Penikese Island; the famous Perkins Institution and Massachusetts School for the Blind, at Boston; and several schools for the deaf.

Penal institutions, under the control of a board of prison commissioners, are administered very effectively, since degrees of criminality are recognized and reformatory influences are brought to bear on such as have not proved themselves hardened. The state prison is at Boston; there is a reformatory for women at Sherborn and one for men at Concord; industrial schools for girls and boys, and a prison camp and hospital, at Rutland.

Government. The state is governed under a constitution which dates from 1780, but a constitutional convention was called to meet in Boston in June, 1917, to frame a new constitution to supplant the document framed in Revolutionary days. The present one provides for an executive department, which consists of a governor, lieutenant governor, secretary, treasurer, receiver-general, auditor and attorney-general, each elected for a term of one year, the governor being assisted by a council of eight members. There is a legislature, or general court, of two houses, a senate of forty members and a house of representatives of 240 members, each elected annually; and for a judiciary there is a supreme judicial court and a superior court, and each county has its probate court and court of solvency. All the judges are appointed by the governor, with the approval of the council, and hold office during good behavior.

The unit of local government is the township, or as it is called in New England, the *town;* it was in the Massachusetts colony that this form of government originated, the old town meeting having served to teach many of the colonists the principles of self-government. Selectmen, elected at the town meetings, are at the head of affairs in unincorporated towns, but cities of 12,000 or more may establish regular municipal governments. The constitution permits the commission form of government to any city that cares to adopt it.

Special Provisions. Massachusetts allows women to vote only for school committeemen. There are on the statute books direct primary laws, strict child-labor laws, laws against the white-slave traffic and statutes regulating the working hours of women. The liquor traffic has been regulated since 1881 by local option laws, and a majority of the towns are prohibition territory.

History. *First Century.* Perhaps the coast of Massachusetts was visited by the Norsemen about the year 1000; certainly it was explored in 1602 by Bartholomew Gosnold, and in 1614 by John Smith, who made maps of it which long remained in use. But its real history began in 1620,

> When a band of exiles moored their bark
> On a wild New England shore.

These were the Pilgrims or Puritans, 102 in number, who had left England because they were not allowed freedom of worship, lived for a time in Holland, and then, determined to found a home of their own, braved the terrors of the little-known seas, and on December 11, 1620 (December 21, according to the revised calendar), landed at Plymouth. The suffering of these colonists of the *Mayflower* was intense, and almost half of them died during the first winter, but in the summer of 1623 their crops flourished, and the next winter was one of comparative comfort. Others of the Puritans kept coming from Holland, and within twenty years after the first Pilgrims had landed, Plymouth Colony boasted eight towns and over 2,500 inhabitants.

Meanwhile, in 1629, a royal charter had been obtained for the "Massachusetts Bay Colony," which had sprung up in the vicinity of Salem, and this latter colony grew rapidly between 1630 and 1640, when the struggle in England between king and Parliament was making it especially unpleasant for the Puritans. Not until 1692 was Plymouth Colony, which had applied again and again in vain for a royal charter, united with Massachusetts Bay under one charter, and this latter was considerably less favorable than the earlier instrument.

From the first Massachusetts Bay Colony had a life far less peaceful than that of Ply-

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RESEARCH QUESTIONS ON MASSACHUSETTS

(An Outline suitable for Massachusetts will be found with the article "State.")

What very interesting phase of physical geography is illustrated by the outstanding peaks of the Connecticut Valley?

What does the name Waltham immediately suggest to you?

Which city has the largest manufacturing industries?

What is there especially interesting about the unit of local government in Massachusetts?

What laws show the progressive character of the state?

What is the "long arm" of Massachusetts?

What articles that we wear every day are manufactured in larger quantities by Massachusetts than by any other state?

What part did Massachusetts play in the abolition movement?

What was the *Liberator?*

What effect would it have on the literary history of the country if Massachusetts and all its writers were blotted out?

Why does Massachusetts no longer raise cereals? What characteristic of the state determines one of its chief agricultural pursuits?

What change did immigration make in the religious statistics?

Who were the Federalists and what attitude did Massachusetts take toward them?

How many states have a larger number of good-sized towns? What has the industrial development of the state had to do with this?

What significant fact in the industrial life of the state is indicated in the lines—

> Boats and boats from the fishing banks
> Come home to Gloucester town.

Who was the first secretary of the state board of education, and why do other states owe much to him?

What was the Boston Tea Party? How did it happen that this state was the leader in the opposition to England?

If the United States as a whole had as many inhabitants to the square mile as has Massachusetts, what would its population be?

What is there interesting about the division of the inhabitants according to birth and parentage?

What distinction has this state with reference to education?

How do its native-born inhabitants rank as regards illiteracy?

What was there inconsistent about the attitude of the early inhabitants of the colony toward religion?

How many states have a smaller area than Massachusetts? How many have a smaller population? How many have a greater density of population?

How did an American humorist express his impression of the climate of New England?

What has been done within the last decade to bring Boston into closer touch with ports to the south of it?

What were the two colonies that grew up in Massachusetts called, and when were they united?

How could you tell, by looking at a map of Massachusetts which showed the cities, where the falls in the rivers occur?

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mouth, for with its determined insistence upon political freedom there was combined a religious intolerance which seems strange when the reason of the colonists for leaving England is taken into account. It was religious intolerance which led to the banishment of Roger Williams (which see) and Anne Hutchinson (which see), and to the founding of Rhode Island and Connecticut; and the same spirit caused persecution of the Quakers and the hanging of several members of that peaceful body, to say nothing of the bitter persecution of the so-called witches.

But all the troubles of the colony were not internal, for the Indians more than once threatened its safety, and were put down only by persistent warfare.

Later Colonial Days. The struggle with the king over the charter, begun in the early days of the colony's life, continued into the eighteenth century, and was unchecked even when the colonists were lending their aid to the mother country during the French and Indian wars (which see). It was natural, then, that when dissatisfaction with English methods began to crystallize throughout the colonies into open opposition, Massachusetts should have taken a leading part. The first encounters of the Revolutionary War took place on Massachusetts soil, and throughout the war the colony was one of the leaders. In 1780 a state constitution was drawn up, and after the close of the Revolution the new state was one of the first to ratify the Federal Constitution.

Statehood Days. In the early days of the republic Massachusetts was very strongly Anti-Federalist, but by 1797 it had been won to the Federalists, nor did it change its policy until after the dissolution of that party. Very bitter was the opposition toward the War of 1812, but despite that fact the state furnished its full share of men and money, and especially in naval affairs contributed much toward final success.

The constitution of the state prohibited slavery, but such passive disapproval did not content the radicals, and Massachusetts became the birthplace of the abolition movement, the first number of William Lloyd Garrison's *Liberator* appearing in Boston on January 1, 1831. True to its principles, the state furnished nearly 160,000 soldiers to the Union army, built and equipped many vessels and contributed about 30,000 men to the navy.

The history of the state since the War of Secession has been one of steady growth. Resources have been developed, and advanced legislation on various subjects has been enacted. Labor questions, because of the multiplicity of industries, have been constantly to the fore, and more than once have been settled only after strikes and rioting have caused great distress. Politically, Massachusetts voted Republican on national questions from the close of the War of Secession until 1912, when Woodrow Wilson carried the state by a moderate majority. In 1916 President Wilson failed to carry the state; it gave its vote to the Republican candidate. A.MCC.

Consult Bacon's *Historic Pilgrimages in New England;* Drake's *On Plymouth Rock;* Hale's *Story of Massachusetts.*

Related Subjects. The following articles will be of interest in connection with a study of Massachusetts:

CITIES AND TOWNS

Adams	Methuen
Amesbury	Milford
Arlington	Natick
Attleboro	New Bedford
Beverly	Newburyport
Boston	Newton
Brockton	North Adams
Brookline	Northampton
Cambridge	North Attleboro
Chelsea	Northbridge
Chicopee	Peabody
Clinton	Pittsfield
Danvers	Plymouth
Dedham	Quincy
Easthampton	Revere
Everett	Salem
Fall River	Saugus
Fitchburg	Somerville
Framingham	Southbridge
Gardner	Springfield
Gloucester	Taunton
Greenfield	Wakefield
Haverhill	Waltham
Holyoke	Watertown
Lawrence	Webster
Leominster	Westfield
Lowell	West Springfield
Lynn	Weymouth
Malden	Winchester
Marlboro	Winthrop
Medford	Woburn
Melrose	Worcester

EDUCATION

Amherst College	Radcliffe College
Boston University	Smith College
Clark University	Tufts College
Harvard University	Wellesley College
Massachusetts Institute of Technology	Williams College

HISTORY

Boston Massacre	Pilgrims
Boston Tea Party	Plymouth Colony
King Philip	Stamp Act
Mayflower	Witchcraft

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LEADING PRODUCTS

Boots and Shoes	Fish
Cod	Granite
Cranberry	Mackerel
Emery	Tobacco

RIVERS

Connecticut	Merrimac
Housatonic	

UNCLASSIFIED

Berkshire Hills	Old South Meeting House
Holyoke, Mount	Plymouth Rock

MASSACHUSETTS BAY COLONY, a colony founded in 1628 at Salem, Mass., by a group of English Puritans who wished religious freedom for themselves. These emigrants, under the leadership of John Endicott, landed in America at a point which they named Salem, after one of the Biblical names for Jerusalem, and governed themselves for a time independent of the king. With the idea that freedom in worship was for themselves only, and not for newcomers, they opposed believers in other faiths, particularly the Quakers (see QUAKERS; also WITCHCRAFT), and defied the king's authority; in consequence, their charter was revoked in 1684. Because of the severity of their restrictions many of their members left the colony to found new homes a little farther inland, and thus Rhode Island and Connecticut received their first settlers.

A new charter was granted in 1691, under which they were governed up to the time of the Revolution. Harvard, the first college for higher education in America, was established in this colony, as was also the free system of public school instruction. See PURITANS; MASSACHUSETTS, subhead *History*.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, *tek nol' o ji,* one of the strongest scientific and technical schools in America, the first institution in the United States to use laboratory methods of instruction. Four-year courses are offered in civil, mechanical, mining and metallurgical, electrical, chemical and sanitary engineering; architecture, chemistry, biology and public health, physics, general science, geology and geodesy, naval architecture and marine engineering, and electrochemistry. There are opportunities for research work in all departments, with specially-equipped laboratories in physical chemistry, applied chemistry and public health. All undergraduate courses lead to the degree of Bachelor of Science. The degrees of Master of Science, Doctor of Philosophy and Doctor of Engineering are given for postgraduate work.

The institute is the land-grant "mechanical college" of Massachusetts. It receives a yearly state appropriation, in return for which it maintains eighty free scholarships. The tuition is $250 per year, except in one course, naval construction, for which it is $500. The institute was incorporated in 1861, largely through the efforts of William Barton Rogers, the first president, but owing to the War of Secession, students were not admitted until 1865. Among the first faculty of ten was Professor Charles William Eliot, later president of Harvard University. Until June, 1916, the school was located in the Back Bay district of Boston; it now occupies a magnificent group of new buildings on the Cambridge side of the Charles River.

In 1914 an agreement was made by the institute and Harvard University whereby the university courses in engineering are given in the buildings of the institute under the supervision of the institute president and a faculty consisting of university and institute professors. Under specified conditions students registered in either institution may attend courses in and receive degrees from the other. Harvard University also transferred to the institute a fund of approximately $15,000,000 which had been bequeathed to Harvard as an endowment for a graduate school of applied science. The school is coeducational, but the courses offered do not attract many women. The institute maintains three publications, the *Technology Quarterly, Proceedings of the Society of Arts* and the *Technology Review.* The library, which is supplemented by that of Harvard and other Boston libraries, contains 120,000 volumes. There are about 300 instructors and 1,900 students.

MASSAGE, *ma sahzh',* a method of medical treatment performed by stroking, friction, kneading or striking the affected parts. It is known to savage as well as to civilized races, and in the Orient, Egyptians, Turks, Japanese and Chinese have employed this manual treatment of the body. It is sometimes confounded with the Swedish movement cure, but the latter requires the active coöperation of the patient to produce results. Massage is used with good results to soothe the nerves, to strengthen the digestive organs and to remove a variety of disordered conditions by pressing out waste material and stimulating circulation. The operator, who performs with his bare hands upon the skin, should be carefully trained and have sufficient knowledge of the

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human system to be able to locate muscles and nerves with the fingers and follow them in the right course. Stroking back and forth as fancy suggests will not bring results.

Massage has long been employed to promote physical and facial beauty; the Greeks and Romans considered it one of their luxuries. Facial massage is extensively used at the present time to remove the traces of time. A male operator is called a *masseur,* a female a *masseuse.* W.A.E.

MASSASOIT, *mas a soit'* (1580-1661), chief of the Wampanoag Indian tribe, whose territory before white men reached New England embraced the southern part of what is now Massachusetts. He made a treaty with the Pilgrims soon after their landing in Plymouth, promising never to allow his people to harm the colonists as long as he lived, and for fifty years the treaty was faithfully kept. In turn the Indians were guaranteed protection. On the first Thanksgiving Day of the colonists, Massasoit and a number of his braves were invited to partake of the feast, and afterward he solemnly said, "The Great Spirit surely must love his white children best." His son Philip became the head of the tribe after his death. See KING PHILIP.

MASSENET, *maa s' neh',* JULES ÉMILE FREDERIC (1842-1912), a French composer of operas and songs, born in Montaud. After studying at the Paris Conservatory he became one of its professors in 1878. He composed a great many operas, of which the best known are *Werther, The Cid, Le Jongleur de Notre Dame, Manon Lescaut, Herodias, Don César de Bazan* and *Thaïs.* Massenet developed graceful and imaginative expression in the instrumentation of his operas, and in *Manon,* particularly, he displayed his gift for creating charming, fluent melody. The famed *Meditation,* played between two acts in the opera *Thaïs,* is intended to typify, in its sensuous color, the soul of the voluptuous Thaïs, which is being purged of wickedness. The latter opera was first produced in Paris in 1894, and owes a great deal of its fame to Mary Garden's interpretation of the principal rôle.

MASSILLON, *mas'i lon,* OHIO, a city in Stark County, eight miles west of Canton, the county seat, and fifty-eight miles south and east of Cleveland. It is on the Tuscarawas River and the Ohio Canal, and on the Baltimore & Ohio, the Pennsylvania and the Wheeling & Lake Erie railroads. Electric roads connect it with near-by cities. The area is four square miles. The population in 1910 was 13,879; in 1916 it was 15,310 (Federal estimate).

The city is the seat of a state hospital, a large institution occupying forty buildings, the first state institute for the insane to conduct a school for education and mental training. Prominent public buildings are the Federal building, erected in 1914 at a cost of $100,000, a city hall, a hospital, a theater and a public library.

The city is in a hilly country which contains rich deposits of coal, white sandstone, potter's clay and iron ore. The industrial enterprises of the city are many and varied; among these are steel mills, aluminum plants, flour and feed mills and agricultural implement works; there are also manufactures of stationary and portable engines, structural steel and iron bridges, stoves and heating furnaces, silos and fire and paving brick. The city has a large trade in wheat.

Massillon was founded in 1825, incorporated as a village in 1853 and chartered as a city in 1868. A.H.

MAS'TERS, EDGAR LEE (1868-), an American lawyer and writer whose name became widely known in 1915, upon the publication of his *Spoon River Anthology.* This book, one of the literary sensations of the period, is a poetic volume, written not in the regular verse forms in which Masters had worked hitherto, but in free verse, which is far better adapted to the very unusual content of the poems. Each short poem is an absolutely frank post-mortem statement by some dweller in the rural cemetery of Spoon River. If every headstone could tell the exact, unvarnished truth, without fear or favor, then a collection of the epitaphs in any graveyard would make just such a book as that of Masters—only, as one critic has said, Masters has viewed his characters with the eye of a criminal lawyer, and there is indeed a lack of "sweetness and light." Remarkable character delineation, the ability to tell much in few words, humor, and here and there a touch of real tenderness, make the book noteworthy.

Masters, who was born at Garnett, Kan., and studied at Knox College, Illinois, was admitted to the bar in 1891, and has since practiced law in Chicago. Before *The Spoon River Anthology* appeared he had published *A Book of Verses, The New Star Chamber* and plays entitled *Maximilian, Althea* and *The Trifler.*

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MAS'TERSING'ERS (German, *Meistersinger*), societies or guilds of singers, popular in Germany from the fourteenth to the sixteenth centuries. The old Minnesingers had strolled through the country singing verses of chivalrous knights and fair ladies. The Mastersingers were organized in the more important towns, such as Mainz, Strassburg and Nuremberg, by the German burghers who wanted to entertain themselves in the long winter evenings by singing the songs of the old minstrels. Gradually they began to compose their own songs, their simple verses being written upon the subjects taken from Bible stories. Charles IV gave them a charter and a coat of arms. Hans Sachs, the shoemaker of Nuremburg, was the greatest poet among them (see SACHS, HANS). Singing contests were held, the prize consisting sometimes of money and sometimes of a wreath of flowers. The organization resulted in the laying down of tedious rules and formulas, to which the tunes and verses must conform, which made them stupid and often absurd, and after the sixteenth century the Mastersingers gradually disappeared. The last society survived at Ulm until 1839. The customs of the Mastersingers are picturesquely treated in Richard Wagner's music drama, *The Mastersingers of Nuremberg*.

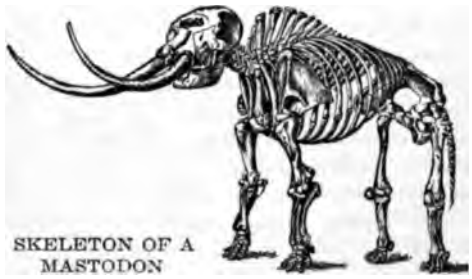
MASTICATION, *mas ti ka'shun*, the first step in the process of digestion. It takes place through the grinding action of the teeth and the mixing of the food with saliva. The term is derived from a Latin word meaning *to chew*. The food, however, is not only chewed by the teeth into small pieces and reduced to a pasty mass by the saliva, which is the mechanical part of the process, but it undergoes some chemical change. That is, the saliva contains a ferment called ptyalin, which has the power of turning the starch in the food into sugar. As starch dissolves very slowly in water and sugar dissolves very rapidly, the chemical action of the saliva plays a part in beginning the digestive process. Meat and eggs, which contain no starch, need comparatively less chewing than such starchy foods as crackers and bread, but all foods should be chewed well. "Bolting" the food, that is, eating so hastily that large, hard lumps pass into the stomach, causes the digestive organs to overwork, and the result is indigestion. Persistence in this habit may lead to chronic dyspepsia. See FLETCHERIZING; DIGESTION. W.A.E.

MASTIFF, *mas'tif*, one of the oldest families of dogs, belonging to the hound breed. It is the largest and most muscular dog known, and is prized for its courage and power, inherited from bulldog ancestors, and for its ability to watch and guard premises and persons, the latter a strongly-marked instinct. It

THE MASTIFF

is a noble-looking animal, with a strong, massive head, hanging ears and deep, overlapping lips. The coat is short, of a light or dark fawn color, except the ears, muzzle and nose, which are black. The height of the shoulders is from twenty-five to thirty inches. Despite its savage appearance, the mastiff is gentle and docile, and makes a desirable pet for children.

MASTODON, *mas'toh don*, the name of a group of extinct animals belonging to the elephant family. The fossil remains of several species which have been excavated in Europe, Asia and America show that they existed in



SKELETON OF A MASTODON

those geologic ages known as Miocene, Pliocene and Pleistocene (see GEOLOGY). The best-known species, mounted specimens of which may be seen in museums in many large cities, roamed in great numbers over the United States and Southern Canada. This mastodon resembled the present elephant in general form and appearance, but its legs were probably shorter. The name, which comes from two Greek words meaning *breast* and *tooth*, refers to the peculiar structure of the molar teeth,

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which terminated in irregular nipple-shaped projections.

MATABELE, *ma ta be' le,* meaning *hidden people,* is the name applied to a Kafir tribe who were once accustomed to appear in battle hidden by large oxhide shields. They are of Zulu stock, and their home is in Matabeleland, which now belongs to the British colony of Rhodesia in South Africa. It lies between the Limpopo and Zambezi rivers, and is north of the Transvaal. When the Boers drove the Matabeles out of the Transvaal in 1837, Mosilikatze, their chief, gathered a military host collected from every tribe which he had conquered during his ten-years' sway in the Transvaal, crossed the Limpopo and established a military tyranny in the new territory. Since the conquest of Matabeleland by the British in 1893, the Matabeles have abandoned their practice of constant warfare for the peaceful life of the farmer and herdsman.

MATAN'ZAS, the capital of the province of Matanzas, Cuba, next in importance to Havana as a railroad and commercial center. Its export of sugar alone averages $15,000,000 annually. It is situated on Matanzas Bay, one of the largest and best of Cuba's harbors, about fifty-two miles east of Havana, with which it is connected by rail. The cave of Bellamar, noted for its great stalactites, and the cave of Yumuri Valley, in the vicinity, attract many visitors. The city was fired upon, but without damage, by the American fleet during the Spanish-American War. Population, 1910, 64,385. See STALACTITE AND STALAGMITE.

MATCHES. Scientists state that when primitive man learned how to produce fire he made the first practical invention, and that this discovery marked his emergence from the lowest state of savagery. Looking down the centuries of human history we see at one end of the inventive chain two pieces of dry wood that the savage rubbed together to produce the precious flame; at the other end is the modern match, an object in such common use it seems always to have been with us. Many ages elapsed, however, before the familiar splint of wood, tipped with an inflammable head, was devised. From rubbing bits of wood together man passed to the production of fire by means of a piece of flint, a steel and a bit of cloth for tinder, and then progressed by slow degrees to less cumbersome methods.

It was not until the beginning of the nineteenth century that any device similar to a match in the modern sense came into general use. For domestic and other purposes it was customary to obtain fire by means of a flint and steel, a tinder-box and splints of wood tipped with sulphur. The tinder consisted of fragments of carbonized linen and cotton treated to a high temperature in a closed vessel. The sparks produced by striking the steel on the flint fell into the tinder, set the mass in a glow, and developed enough heat to set fire to the sulphur tips of the splints. These splints were known as "brimstone matches" and "spunks." In the year 1805 a French scientist devised an apparatus consisting of a small bottle containing asbestos saturated with sulphuric acid, together with splints coated with sulphur and tipped with a mixture of sugar and chlorate of potash. Fire was produced by chemical action; the match heads ignited when brought in contact with the substance in the bottle.

Friction Matches. The device described above, known as the *instantaneous light box,* was both dangerous and inconvenient, and was superseded by the *friction match,* said to be the invention of John Walker, an English druggist. The friction match was introduced in the year 1827, and its invention marks the beginning of the modern industry. Walker's match consisted of a wooden splint or stick of cardboard coated with sulphur and tipped with a mixture of chlorate of potash, sulphide of antimony and powdered gum. The match was ignited by being drawn through a piece of bent sandpaper.

The next important step in the development of the match was the invention of the phosphorus friction match, which was brought into general commercial use in 1833. The first of this type made in the United States were manufactured at Springfield, Mass., in 1836. They were of the "strike anywhere variety," and the inflammable head consisted of white or yellow phosphorus, together with sulphur and other substances that yield oxygen readily in the presence of heat, such as chlorate of potash, red lead, nitrate of lead and peroxide of manganese. White or yellow phosphorus is a deadly poison, which is liable to infect operatives who handle it with a distressing disease called "phossy jaw." The terrible suffering endured by workmen in match factories led to an international movement for their protection, and the use of white or yellow phosphorus is now forbidden by law in practically every country engaged in the manufacture of matches. The substance now most widely em-

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ployed as a substitute is *sesqui-sulphide of phosphorus,* a harmless ingredient which is quite as satisfactory as the white phosphorus. Red phosphorus has also found favor as a substitute.

Safety Matches. A match known as a safety match was the invention of a Swedish manufacturer named Lundstrom; this has been on the market since 1855. As its name implies, this match can be ignited only by being rubbed on a specially-prepared surface. Its head contains no phosphorus, but holds a mixture of which chlorate of potash usually forms a part. The striking surface, which is on the side of the box, is formed by a compound of red phosphorus and sand. The manufacture of safety matches is confined largely to Sweden and Norway.

How Matches Are Made. In the match industry the best grade of lumber is used. The ordinary match is made from two-inch planks of white pine, from which all knots and cross-grained portions have been removed. The wood is sawed into blocks the length of a match, that is, from one and seven-eights to two and one-half inches, and the blocks are then run through a machine which cuts them into rows of splints, each row containing splints for forty-four matches. As each row of splints is cut from the block it is placed in a machine consisting of cast-iron plates formed into an endless chain by link attachments. This machine, revolving from 175 to 250 times a minute, cuts forty-four matches at each revolution. When the splints have been cut they are carried from the cutting end of the machine by the endless chain attachment over a block which heats the ends, then to a receptacle containing melted paraffin, and finally to one containing the substance of which the heads are made.

The match tips are heated so the paraffin will not become chilled as it comes in contact with them, and the receptacles containing paraffin and the composition which forms the head are automatically replenished without any interruption of the work of the machine. The bundles of matches are finally cooled by blasts of cold, dry air and are automatically deposited in boxes. A machine of this type will turn out one hundred gross of boxes a day, and requires the attention of eight girls. These boxes are fed into the machine automatically, and when filled they are deposited on a rotating table. There a number of girls place covers on them and pack them into cases, and the operation is completed. Two million matches can be produced in one day by machinery requiring the services of only seventy-five operatives. M.R.T.

MATÉ, *mah' ta,* or **PARAGUAY,** *pair' a gway,* **TEA,** a South American holly, whose leaves and shoots are used, when dried and roughly ground, for making tea. The term *maté* was applied originally to the vessels in which the drink was steeped. These vessels were made of gourds, or calabashes. The tea is made by pouring boiling water over the dried leaves and stems. It has the same stimulating effect as ordinary tea on account of the presence of a large proportion of *caffein,* which is also found in tea and coffee.

Maté is a shrub or small tree with wedge-shaped leaves and small flowers in the axils of the leaves. Maté raising is an extensive industry in Paraguay and Brazil, over 5,000,000 pounds of the dried leaves being exported annually from Paraguay alone. See HOLLY.

MATE, a corruption of an old English word *gemaca,* means a comrade or companion. In merchant vessels a mate is one of the assistants of the captain, or master. The *first mate* is always second in command, except on ocean passenger steamers, where great division of authority is necessary. In warships the mates are not assistants to captain or other officers, but serve under the gunners, carpenters and boatswains and have specified duties. According to the position they occupy they are called carpenter's mate, gunner's mate, boatswain's mate, etc.

MATERIALISM, *ma te' ri al iz' m,* a system of philosophy which teaches that matter is the only thing in the universe that has reality, and which denies the existence of mind or soul as distinct from matter. All mental processes are regarded as the result of physical changes in the nervous system, and thoughts, will and feelings are said to have no real existence. The word comes from the Latin *materia,* meaning *matter;* the theory of materialism dates back to a period before Socrates, over 400 years before Christ. In a modified form the principles of materialism have been upheld by such eminent English philosophers as John Locke, John Stuart Mill, Thomas Hobbes and Herbert Spencer, but the opposite system, idealism, is more in favor.

In a popular sense materialism is applied to the tendency to attach greater value to the things of the material world rather than to the mind and spirit.

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MATE'RIA MED'ICA, a Latin phrase meaning the *materials of medicine,* is the division of medical science which relates to the materials used in the cure, alleviation or prevention of disease. The materials are classified according to physical properties, method of preparation, composition, their action as curative agents, etc. See MEDICINE AND DRUGS.

MATHEMATICS, *math e mat'iks.* To the child in the elementary school mathematics means arithmetic, processes of addition and subtraction; to the high school pupil the conception widens and takes in algebra and, later, geometry; while to the student who pursues the subject further the term takes on an even broader meaning. But in all these branches, no matter how they may differ in subject-matter and in methods, there is a similarity—they are all sciences which deal with magnitude, quantities and numbers, and their relations. That is about as good a definition as can be given of mathematics, for while some of the greatest scientists and philosophers have attempted to define the term, no one has ever succeeded to the satisfaction of all.

All mathematical conceptions—that is, all conceptions or ideas which can be definitely described in terms of numbers—are within the scope of mathematics; and even the person who could not define a mathematical conception, or perhaps has never even heard the name, can tell whether or not any notion does come within the range of mathematics. It is clear, for instance, that sugar, regarded as the chief ingredient of candy, is not a mathematical conception; when only its bulk, its weight and its price are considered it is such a notion. A book may contain the wisdom of the ages, or all the beauties of poetry, and thus lie quite outside the scope of mathematics, but in so far as it is a rectangular solid with a definite length, breadth and thickness, it is a mathematical conception.

The Great Branches. Mathematics is not just one science, but a great group, joined together by similarity in subject matter and treatment. As generally considered, it is divided into three great departments, but these are so closely related, so interwoven with each other, that no hard and fast distinctions are possible. The departments are:

(1) *Arithmetic,* which deals with the nature and properties of numbers, and with operations performed by means of them. This branch also includes algebra in so far as the latter science is but generalized arithmetic, expressing the same facts in symbols instead of figures;

(2) *Analysis,* which includes some of the more abstruse and theoretical phases of algebra, as differential equations, but has as its main branch calculus;

(3) *Geometry,* which treats of the measurement and properties of lines, angles, surfaces and solids. One branch of this subject, analytical geometry, is included by some authorities under analysis. Trigonometry is a higher phase of geometry.

Pure and Applied Mathematics. Anyone who has studied geography or physics or astronomy knows that from time to time he has much use for mathematics. He knows, too, that he uses numbers not as abstract things with no especial connection with the concrete affairs of life, but as a means of finding out certain very definite facts. This phase of mathematics, which considers theories and principles only as they are related to the material world, is known as *applied* mathematics, and it is opposed to *pure* mathematics, which treats of theories and principles for their own sake. The student who masters the multiplication table is studying pure mathematics; it makes no difference to him whether grains of sand or solar systems are under consideration—two times six makes twelve in either case.

Pure mathematics lies at the basis of applied mathematics, but this does not mean that the latter is of minor importance. In studying such practical subjects as heat and optics and electricity, applied mathematics is of the greatest service, and many of the discoveries of science could never have been made without its help. An illustration of this fact will be interesting. The planet Uranus, over a billion and a half miles from the sun, was believed by astronomers to be the outermost member of the solar system, and all its movements were carefully charted. But observation showed that at times it behaved very strangely, apparently wandering out of its path, and astronomers decided that only the attraction of another planet, far beyond it, could thus pull it from its course. Accordingly they set to work, and by means of mathematical formulas figured out where the new planet ought to be. Then when all was ready, they examined the heavens through their strongest lenses, and there was the planet just where they had calculated it must be, and they named it Neptune. The telescope alone might never have discovered this planet.

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Story of Mathematics. As long ago as 3000 B.C. the Egyptians knew a great deal about mathematics. Many of their methods, to be sure, were cumbersome, but arithmetic, algebra and geometry were all understood to some extent. The Babylonians, too, knew something of the science, of which they made use in their studies in astronomy. But only with the Greeks was the real science of mathematics developed. Though they worked out to a certain extent a theory of numbers, it was in geometry that they were chiefly interested, and some of their great geometers left little to be discovered in certain phases of that subject (see GEOMETRY). It seems strange that the practical Romans should have made so little contribution to the subject, but not so strange that the theorizing, mystical scholars of the Middle Ages should have neglected it.

Meanwhile, however, the Oriental nations had taken up mathematics, and the Hindus and Arabs developed to a creditable degree arithmetic, algebra, geometry and even astronomy. It is not fair to give, as is usually done, the credit for the modern system of numbers to the Arabs, for the Hindus invented it, and the Arabs merely borrowed it. Interesting to note is the fact that the Persian Omar Khayyam, whose *Rubaiyat* is world-famous, was not only a poet but an authority on algebra. The results of much of this Oriental study and discovery were carried by the Arabs to Spain, and thus Europe was roused to a new interest in mathematics.

The Renaissance (which see) gave new birth to mathematics, and from that time onward development was fairly rapid. Descartes, who lived in the seventeenth century, gave a great impetus to the science, helping particularly to make elementary algebra what it is to-day. Other great names in the history of mathematics are those of Kepler, whose contributions to geometry were epoch making; and of Newton and Leibnitz, who practically remade higher mathematics by their discovery of the principles of calculus.

The work of these masters left little to be done in regard to the fundamental theories and principles, but the later centuries have been by no means idle. They have evolved a multitude of new methods and new applications, some very difficult and abstruse, and beyond the reach of any but scholars, others which have as their object the simplifying and illuminating of the lower branches. All in all, it may be said that the constant tendency is to make mathematics as studied in the schools more practical; to give problems which are not mere abstractions but have a relation to the life of the pupils. Many of the theories and reasonings which used to be looked upon as an integral part of the subject are now taught only to those students who expect to do advanced work in mathematics, and elementary pupils are not compelled to study principles which they cannot possibly use in their later life.

Mathematics is universally taught in the schools. The articles in these volumes on the various branches discuss the value, both practical and disciplinary, of the subject in all its departments. A.McC.

Related Subjects. The reader who is interested in mathematics is referred for wider and more detailed treatment to the following articles in these volumes. Some of these also contain extensive indexes, so that the list referred to is a wide one.

Algebra	Geometry
Arithmetic	Mensuration
Calculus	Trigonometry

The lives of the following eminent mathematicians are also treated in these volumes:

Archimedes	Napier, John
Descartes, René	Newton, Sir Isaac
Dodgson, Charles L.	Omar Khayyam
Euclid	Plato
Kepler, Johann	Ptolemy
Laplace, Pierre Simon	Pythagoras
Legendre, Adrien M.	
Leibnitz, Gottfried Wilhelm	

MATH'ER, the family name of two very notable clergymen, father and son, of colonial times in America.

Increase Mather (1639-1723) was born in Dorchester, Mass. His unusual name was bestowed upon him "because of the never-to-be-forgotten increase of every sort wherewith God favored the country about the time of his nativity." He was a precocious boy, for he was graduated from Harvard at the age of seventeen, after which he went to Dublin for further study. Certain sermons which he delivered in England were favorably received, and at the time of the Restoration he was urged to settle there, but he returned to Massachusetts and in 1664 was made pastor of the North Church of Boston. His influence was great on State as well as Church questions, and in 1688 he was sent to England to regain the colonial charter which had been revoked by Charles II. He failed to do that, but accepted from William II a new charter which was in most respects satisfactory. It was while he was in England that

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the Salem witchcraft panic occurred, and he had no active part in it.

Meanwhile, in 1681, he had been appointed president of Harvard College, but had resigned because his church would not release him. Four years later he accepted a similar appointment on condition that he might live in Boston and continue a fairly close relation with his parish. He held the position until 1701, when the general court of Massachusetts passed an act requiring Harvard's president to live in Cambridge. The act was aimed at Mather, because of enemies he had made. His later years were devoted to his church and contained little that was of general interest. His published works were numerous and include *A Brief History of the War with the Indians in New England, An Essay for the Recording of Illustrious Providences,* a *Discourse Concerning Comets* and *Cases of Conscience Concerning Witchcraft.*

Cotton Mather (1663-1728) was the son of Increase Mather and grandson of John Cotton. He was born in Boston, entered Harvard College at the age of eleven and was graduated with honors when but fifteen. The attention which his precocity drew upon him resulted in making him vain, and from these faults he never entirely recovered. In 1680 he became his father's assistant in the North Church, Boston, though it was not until five years later that he was ordained pastor. While still a young man he became one of the most influential figures in the colony, but his genuine zeal and scholarship have been so overshadowed by his connection with the witchcraft movement, while his father was in England, that they are frequently overlooked. He was not alone among eminent and scholarly men in his belief in witchcraft, but he was more active than most in stirring up the crusade against it. He wrote *Memorable Providences Relating to Witchcraft and Possessions* and *Wonders of the Invisible World;* he investigated cases for himself, always with a strong prejudice against the accused, and counseled the magistrates to proceed with vigor in rooting out the supposed evil.

After the witchcraft excitement had abated, Cotton Mather's influence decreased somewhat. Like his father, he was an earnest conservative and vigorously opposed the introduction of new ideas, especially in Harvard College, of which his father was president for seventeen years. He himself hoped to attain the presidency, but was more than once disappointed. His greatest work, the *Magnalia Christi Americana,* or *Ecclesiastical History of New England,* while full of the prejudices of its author, is a valuable document to students of colonial history. He also wrote *Essays to Do Good,* which are yet sometimes widely read, and a curious life of his father, called *Parentator.* A.McC.

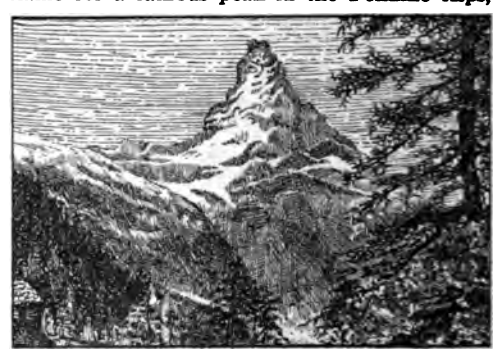
See, also, MASSACHUSETTS BAY COLONY. Consult Pond's *The Mather Family;* Walker's *Ten New England Leaders.*

MATTEAWAN, *mat a wahn'*, N. Y., the former name of BEACON, N. Y. (which see).

MATTER. According to a principle of physical science, anything that occupies space is said to be *matter.* This definition takes no account of the size, shape or substance of any portion of matter, for the term includes the air we breathe and the water we drink, the objects of furniture in a room and the materials of which the house itself is made. The various measurements with which we are familiar are based on the fact that every portion of matter has three dimensions—length, breadth and thickness. In regard to structure, matter is believed to be made up of very small particles called *molecules.* When subjected to chemical action these units are separated into *atoms* (see MOLECULE; ATOM; ATOMIC THEORY). The relation of the molecules to each other determines the *state of matter,* whether it is solid, liquid or gaseous.

Properties of Matter. There are certain characteristics or properties of matter, some of which are common to all forms, and some of which are possessed only by certain kinds. The more important of these properties are hardness, extension, porosity, elasticity, gravitation, cohesion, adhesion, tenacity, malleability and ductility. Each one named is described in these volumes under its proper heading. C.R.M.

MATTERHORN, *mat'er horn,* the German name for a famous peak in the Pennine Alps,



THE MATTERHORN

on the boundary between the canton of Valais, Switzerland, and Piedmont, Italy, about forty miles from Mont Blanc. This mighty peak,

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which rises like a giant sentinel from the giant masses about it, and whose upper slopes are covered with eternal snows, is one of the most superb mountains of the world. A great many daring travelers have attempted to reach its summit, 14,782 feet above the sea, but it was not until 1865 that the ascent was accomplished. In that year a party led by Edward Whymper, a British mountaineer, climbed to its top, but in descending four of the party fell over a precipice and were killed. Since then the Matterhorn has been scaled repeatedly.

MATTHEW, SAINT, one of the Twelve Apostles, accepted as the author of the first book of the New Testament, the *Gospel According to Saint Matthew.* According to his own statement, he was a publican, or tax-gatherer, and was called to be a follower of Jesus, as he sat in his place of business. Mark and Luke call him Levi, and speak of him as the son of Alphaeus, thus making him possibly the brother of another Apostle, James, the son of Alphaeus. Nothing further is recorded of him in the Gospels save that he gave a feast in honor of Jesus, to which he invited other publicans. The *Acts of the Apostles* mentions him once, and later non-Scriptural accounts declare that after preaching for some years in Jerusalem he visited other countries as an evangelist. Most of the early legends agree that he died a natural death, but there are some which declare that he suffered martyrdom in Ethiopia, now known as Abyssinia.

MATTHEWS, [JAMES] BRANDER (1852-), an American educator and man of letters, was born in New Orleans. After graduating from Columbia College he studied law, but soon turned from that profession to literature. His works have been varied, including stories, comedies, essays on subjects connected with the drama, and studies in literature. *An Introduction to the Study of American Literature* is one of his best-known works. Among the others are *Americanisms and Briticisms, Vignettes of Manhattan, French Dramatists of the Nineteenth Century;* the comedies, *Margery's Lovers* and *In the Vestibule Limited,* and the novel, *His Father's Son.* Matthews helped to found the American Copyright League, and took an active part in the simplified spelling movement.

MATTOON, *ma toon',* ILL., a manufacturing city in Coles County, with a population of 11,456 in 1910, which increased to 12,582 (Federal estimate) in 1916. It is situated southwest of the geographical center of the state, 128 miles west of Indianapolis, 133 miles northeast of Saint Louis and 172 miles southwest of Chicago. The city is served by the Cleveland, Cincinnati, Chicago & Saint Louis and Illinois Central railways; an electric line extends east to Charleston, Ill. In 1855 the city was settled and incorporated. The area is four square miles.

Mattoon is located in an agricultural district which produces grain, live stock, fruit and broom corn, the yield of the last-named being extensive. Among the leading industrial plants are broom factories, flour mills, grain elevators, wagon and carriage factories, tile factories and foundries. In addition to these there are the repair shops of the two railroads operating through the city. The prominent buildings are a $90,000 Federal building, an Old Folks' Home (I. O. O. F.) and a Carnegie Library.

On May 26, 1917, a tornado visited the city, destroying a section five blocks wide, killing fifty-seven people, injuring several hundred, and rendering over 2,000 homeless.

MAUNA KEA, *mau'nah kay'ah,* a burnt-out volcano of Hawaii, the highest peak on the Pacific islands. It is 13,823 feet above the sea, and during most of the year the top is white with snow. From this feature it receives its name of Mauna Kea, the Hawaiian expression for *white mountain.* From a distance Mauna Kea looks like a huge mound, whose slopes, except near the top, are green with coffee and cane plantations. The upper portion is a desolate waste of reddish ashes and lava rock, with snowdrifts in the crevices and sheltered places.

MAUNA LOA, *mau'nah lo'ah,* "Great Mountain," the world's largest volcano, situated on the island of Hawaii. The volcano is 13,675 feet high; its enormous crater, a mile and a half in diameter, contains a lake of liquid fire, and its smoke rises like a cloud both by day and night. Ordinarily 400 feet below the top of the crater, the liquid lake sometimes rises to within fifty feet of the top. The natives formerly stood in great fear of the volcano, believing that a raging goddess named Pele dwelt in the fire and that, if offended, she would "shake with her thunders and shatter her island." Mauna Loa bursts into activity about once every ten years. Since 1916 it has been a part of the Hawaii National Park. See VOLCANO.

MAUNDY, *mawn'di,* **THURSDAY,** commonly known as HOLY THURSDAY, the Thursday preceding Easter Sunday. It is celebrated in commemoration of the Last Supper and the washing of the Disciples' feet by Jesus. In England and other countries, it was formerly the custom for the sovereign on this day to

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wash the feet of twelve poor persons and bestow gifts upon them. The custom of washing the feet still exists among Roman Catholics, the bishops or priests washing the feet of twelve altar boys. In Rome, the Pope on this day washes the feet of twelve bishops. G.W.M.

MAUPASSANT, *mo pa sahN',* HENRI RENÉ ALBERT GUY DE (1850-1893), a French writer of fiction, born at Miromesnil Château in Normandy. He was educated at Yvetot and Rouen, France, and when about twenty years of age entered government service in the department of public instruction, but was dissatisfied because of his great interest in literature, especially fiction. In 1880 he contributed to a book of fiction a short story entitled *A Ball of Tallow.* It was a masterpiece, and immediately placed him among the foremost writers of France. During the next year he wrote *The Foolscap House,* a collection of short stories, and critics began to speak of him as the most skilful short-story writer the nation had yet produced.

In 1883 he wrote his first novel, *A Life.* It is a marvelous example of accurate observation, without the least emotion or effort to impress a moral lesson, and yet deeply affecting because of its tone of absolute truthfulness. Except in Hugo, France had never seen such literary art, and Maupassant found himself surrounded by admiring disciples anxious to learn his style.

Between 1883 and 1886 his skill was at its height, and many masterpieces appeared in such collections of stories as *Miss Harriet, Yvette, Stories and Novelettes* and *Tales of the Day and Night.* It was during this period that he wrote *The Necklace,* now generally considered the most perfect short story in any language.

By 1886 Maupassant's best work was completed. A nervous malady and his violent exercise in an effort to cure it had greatly weakened him; he began to show signs of insanity, but continued his writing and displayed more sympathy but less skill in his fiction. In 1891 general paralysis came upon him; early the next year his reason gave way entirely, and on July 6, 1893, he died in a Paris hospital.

MAURITIUS, *maw rish' i us,* a British island in the Indian Ocean, 550 miles east of Madagascar, once known, during a brief period of French dominion, as ILE DE FRANCE. It was discovered by the Portuguese in 1505, and in 1598 was ceded to the Dutch, who gave the island its present name in honor of Count Maurice of Nassau. Abandoned by the Hollanders in 1710, it was taken over by the French, and in 1814, at the close of the Napoleonic wars, was formally ceded to Great Britain, to whom it now belongs.

Mauritius has an area of 720 square miles, and is therefore three-fifths as large as Rhode Island. Several extinct craters indicate that it is of volcanic origin. It is skirted by coral reefs and diversified by hills and low, rugged mountains of varied and picturesque beauty. A charming description of the island scenery is given by Bernadin de Saint Pierre in his beautiful romance *Paul and Virginia,* the scenes of which are laid in Mauritius. Port Louis, the principal town and the capital of the island, is located on a harbor provided with an inner basin called the *Fanfaron;* here vessels take refuge during the violent hurricanes which frequently sweep over the island.

In 1913 Mauritius had an estimated population of 379,850. Less than one-third of the inhabitants are Europeans, the bulk of the population consisting of native East Indians. There are about sixty government schools, ample telephone and telegraph lines and about 130 miles of railway. A thriving trade is carried on with the United Kingdom, South Africa, Australia, India, France and Madagascar. Sugar is the principal article of export, but molasses, rum, cocoanut oil and vanilla are also shipped away. The chief imports are rice, wheat and other grains, cotton goods, wine, coal and hardware.

MAUSOLEUM, *maw so le' um,* a term applied in modern times to a tomb of considerable architectural pretensions, often taking the form of a burial chapel. The word was derived from the tomb of Mausolus, a king of Caria, near the Aegean Sea. When he died, in 353 B. C., Artemisia, his widow, erected at Halicarnassus one of the most magnificent tombs the world has ever seen. Artemisia died before the tomb was completed, but the work was carried on by the most famous sculptors of ancient times, and became known as one of the wonders of the world.

See SEVEN WONDERS OF THE WORLD; also the illustration in article MASONRY.

MA'VOR, JAMES (1854-), a Canadian economist and educator, generally regarded as the foremost of contemporary Canadians in his field. Professor Mavor is not merely a writer on economic theories, nor a teacher, but a practical investigator whose services have been used by the British and Canadian governments to study numerous economic and social problems, including labor conditions, immigration, copyright, railway rates and grain production.

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Professor Mavor was born at Stranraer, Scotland, and received his schooling at Glasgow, where he completed his education at the university. In 1888 he was appointed professor of political economy and statistics in Saint Mungo's College, Glasgow. There he taught for four years, and also found time to act as editor of the *Scottish Art Review,* and as assistant editor of a technical journal, and to take an active part in university-extension work and in numerous schemes for social progress. In 1892 he was appointed one of a committee of four to investigate the operation of labor colonies in Germany, and in the same year was called to Canada as professor of political economy in the University of Toronto. In succeeding years his investigations took him to all parts of the earth, but his work as a teacher has continued to take the larger share of his time.

Professor Mavor is a voluminous writer. Of particular interest to Canadians are the following: *Report to British Board of Trade on the Northwest of Canada; Taxation of Corporations in Canada; Railway Transportation in America; Taxation in Ontario; A Short Economic History of Canada;* and *Government Telephones, The Experience of Manitoba.* Of more general interest are his *Wage Theories and Statistics; An Economic History of Russia;* and a general treatise on *Economics.*

MAX'IM, Sir Hiram (1840-), an American inventor, born in Maine, afterwards becoming a naturalized Englishman, receiving knighthood in 1901. He invented the guns that are known by his name and which are used by nearly every civilized nation. Maxim had a horror of war and hoped his guns would make everybody see how terrible war really is and render conflicts less likely to occur. *Maximite,* invented by him specially for use with the Maxim gun, was patented in England in 1889 and is a mixture of trinitrocellulose, nitroglycerine and castor oil. He also invented an incandescent light and a searchlight. In 1894 he devised a flying machine which met with partial success.

MAXIMILIAN, *mak si mil' yan* (1832-1867), an Archduke of Austria who is remembered chiefly for his brief rule as emperor of Mexico. Maximilian was a brother of Emperor Francis Joseph of Austria (which see). He became commander of the Austrian navy in 1854, and later governor of Lombardy and Venetia. When French troops interfered in the affairs of Mexico and established an empire there (see **Mexico,** subtitle *Government and History*), Maximilian took the throne under protest, but he immediately tried to regenerate the country. However, he did not understand the people, and his efforts only aroused their hatred; matters were made more hazardous for him by withdrawal, upon the protest of the United States government, of the French troops sent by Napoleon to support the new emperor. Though he made a brave effort to hold his authority, he was betrayed, and after a short confinement was tried by a military court in 1867, convicted of treason, and shot. His extensive writings were published after his death.

MAXIMILIAN I (1459-1519), a Holy Roman emperor, of note chiefly for his success in promoting the fortunes of the House of Hapsburg. He was the son of Frederick III, whom he succeeded in 1493. In 1477 he married Mary, daughter of Charles the Bold, and had thus acquired a claim to Burgundy and the Netherlands. He had to fight for his rights, however, with Louis XI of France, who finally succeeded in wresting from him a portion of the inheritance.

Mary died in 1482; and in the year that he became emperor (1493) he married Bianca, daughter of the Duke of Milan; the alliance brought him long-continued war in Italy but no accession of territory. He caused his son Philip to marry Joanna, daughter of Ferdinand and Isabella of Spain, thus securing that country to the royal house of Austria; and for two of his grandchildren he arranged marriages with the son and daughter of the king of Hungary and Bohemia, and by so doing established a claim on those countries. Though Maximilian placed the interests of his house above those of the empire, he was not neglectful of the latter, and unsuccessfully attemped, in 1495, to allay the constant civil strife which disturbed the empire by the proclamation of a perpetual peace. It was during Maximilian's reign that the Swiss secured their independence from Austria. See Hapsburg, House of.

MAXIMILIAN II (1527-1576), a Holy Roman emperor whose mild rule gave Germany a chance to recover in a measure from the turbulent times through which it had been passing. He was the son of Emperor Ferdinand I, and was brought up among the strictest of Catholic surroundings, but he showed himself favorable to the new religion, and the Protestants hoped for much when he came to power. On his accession to the imperial dignity in 1564, however, he proved himself a man of little spirit, and the Protestants were disappointed in their hopes.

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MAY CALENDAR

Birthdays

1. Joseph Addison, 1672.
   George Inness, 1825.
2. Catharine II (Russia), 1729.
   Sir Alexander Tilloch Galt, 1799.
3. Jacob A. Riis, 1849.
4. John Graves Simcoe, 1793.
   Horace Mann, 1796.
5. Hubert Howe Bancroft, 1832.
6. Maximilian Robespierre, 1758.
   Robert E. Peary, 1856.
7. Robert Browning, 1812.
8. Sir Samuel Leonard Tilley, 1818.
9. John Brown, 1800.
10. James G. Bennett, Jr., 1841.
11. Jean Léon Gerome, 1824.
12. William Howe, 1803.
    Robert Baldwin, 1804.
13. Maria Theresa, 1717.
14. Gabriel Daniel Fahrenheit, 1686.
15. Florence Nightingale, 1820.
16. Honoré de Balzac, 1799.
17. Edward Jenner, 1749.
    Alfonso XIII, 1886.
19. John Gottlieb Fichte, 1762.
20. John Stuart Mill, 1806.
21. Albrecht Dürer, 1471.
22. Wilhelm Richard Wagner, 1813.
23. Thomas Hood, 1799.
24. Karl von Linné, 1707.
    Queen Victoria, 1819.
25. Ralph Waldo Emerson, 1803.
    Edward Bulwer-Lytton, 1803.
27. Dante, 1265.
    Nathanael Greene, 1742.
    Julia Ward Howe, 1819.
28. William Pitt, 1759.
    Louis J. R. Agassiz, 1807.
29. Charles II, 1630.
    Patrick Henry, 1736.
31. Walt Whitman, 1819.

Events

1. Legislative union of England and Scotland, 1707.
   Battle of Manila Bay, 1898.
2. Hudson's Bay Company chartered, 1670.
   "Stonewall" Jackson wounded at Chancellorsville, 1863.
3. Jamaica discovered, 1494.
4. Napoleon arrived at Elba, 1814.
5. Historic meeting of States-General, 1789.
6. Secession of Arkansas and Virginia, 1861.
7. *Lusitania* sunk by German submarine, 1915.
8. Charles II proclaimed king, 1660.
9. Accession of George V proclaimed, 1910.
10. Ticonderoga captured by Ethan Allen, 1775.
    Death of "Stonewall" Jackson, 1863.
11. Minnesota became a state, 1858.
12. Charleston, S. C., captured by British, 1780.
13. Confederacy recognized by Great Britain as belligerents, 1861.
14. Henry IV of France assassinated, 1610.
15. The *Alabama* launched at Birkenhead, England, 1862.
    Louis Riel surrendered, 1885.
16. Memorial to Queen Victoria unveiled in London, 1911.
18. Great fire in Montreal, 1765.
    Lincoln nominated, 1860.
19. Treaty between United States and Mexico, 1848.
20. Secession of North Carolina, 1861.
    Sir John A. Macdonald became Premier of Canada, 1862.
21. Panama Canal voted by House free of toll to American coastwise vessels, 1912.
22. Kansas-Nebraska Bill passed by House, 1854.
23. Italy declared war on Austria, 1915.
24. Empire Day first observed in Great Britain as memorial to Queen Victoria, 1904.
25. Constitutional Convention began its work, 1787.
26. Rebel Canadian Indian chiefs surrendered, 1885.
27. Robert Bruce crowned king of Scotland, 1306.
28. Spanish Armada left Lisbon, 1588.
29. Jacques Cartier sailed to colonize Canada, 1535.
    Wisconsin became a state, 1848.
30. Joan of Arc put to death, 1431.
31. The Johnstown flood, 1889.
    Great naval battle off Danish coast, 1916.

For Study

Bean
Bee
Bird
Cat
Codling Moth
Fly
Grafting
Insect pests
Leaf
May Beetle
Migration of Birds
Poultry
Scarlet Tanager
Stems
Strawberry
Trillium
Violet
Weeds

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MAY QUOTATIONS

1. The spacious firmament on high,
With all the blue ethereal sky,
And spangled heavens, a shining frame,
Their great Original proclaim.
—*Addison.*

2. The Spring is here—the delicate footed May,
With its slight fingers full of leaves and flowers,
And with it comes a thirst to be away,
In lovelier scenes to pass these sweeter hours. —*Willis.*

3. There's no dearth of kindness
In this world of ours;
Only in our blindness
We gather thorns for flowers.
—*Massey.*

4. Education alone can conduct us to that enjoyment which is, at once, best in quality and infinite in quantity.
—*Mann.*

5. It is the season now to go
About the country high and low,
Among the lilacs hand in hand,
And two by two in fairyland.
—*Stevenson.*

6. It is by presence of mind in untried emergencies that the native metal of a man is tested. —*Lowell.*

7. When the fight begins within himself,
A man's worth something.
—*Browning.*

8. Among the changing months, May stands confest
The sweetest, and in fairest colors dressed. —*Thomson.*

9. The Hawthorn whitens, and the juicy Groves
Put forth their buds, unfolding by degrees,
Till the whole leafy Forest stands displayed,
In full luxuriance, to the sighing gales.
—*Thomson.*

10. Clever men are good, but they are not the best. —*Carlyle.*

11. Worth, courage, honor, these indeed
Your sustenance and birthright are.
—*Stedman.*

12. And watch the gold air and the silver fade,
And the last bird fly into the last light.
—*Rossetti.*

13. When April steps aside for May,
Like diamonds all the rain-drops glisten;
Fresh violets open every day;
To some new bird each hour we listen.
—*Larcom.*

14. Every one is the son of his own works.
—*Cervantes.*

15. A Lady with a lamp shall stand
In the great history of the land,
A noble type of good,
Heroic womanhood.
—*Longfellow,* of Florence Nightingale.

16. Hail, bounteous May, that doth inspire
Mirth, and youth, and warm desire;
Woods and groves are of thy dressing,
Hill and dale doth boast thy blessing.
—*Milton.*

17. That's the wise thrush; he sings each song twice over,
Lest you should think he never could recapture
The first fine, careless rapture!
—*Browning.*

18. We'll lie in the shades
Of the flow'r-covered glades,
And hear what the primroses say.
—*McLachlan.*

19. A soft answer turneth away wrath; but grievous words stir up anger.
—*Bible.*

20. Spring, with a mantle made of the gold held close in a sunbeam's heart,
Thrown over her shoulders bonnie and bare—see the sap in the great trees start! —*Blewett.*

21. Spring's last-born darling, clear-eyed, sweet,
Pauses a moment, with white twinkling feet,
And golden locks in breezy play,
Half teasing and half tender, to repeat
Her song of "May." —*Coolidge.*

22. Then came fair May, the fairest maid on ground,
Deck'd all with dainties of the season's pride,
And throwing flowers out of her lap around. —*Spenser.*

23. Charity and personal force are the only investments worth anything.
—*Whitman.*

24. One voice, one people, one in heart,
And soul, and feeling, and desire.
—*Sangster.*

25. So nigh is grandeur to our dust,
So near is God to man,
When Duty whispers low, Thou must,
The youth replies, I can.—*Emerson.*

26. Down in the budding woods unseen,
Amid mosses green,
The fair hepatica wakes to meet
The hastening feet. —*Machar.*

27. Mine eyes have seen the glory of the coming of the Lord:
He is trampling out the vintage where the grapes of wrath are stored:
He hath loosed the fateful lightning of his terrible swift sword:
His truth is marching on.
—*Julia Ward Howe.*

28. You may break, you may shatter the vase if you will,
But the scent of the roses will hang round it still. —*Moore.*

29. I know not what course others may take, but as for me, give me liberty or give me death. —*Patrick Henry.*

30. The voice of one who goes before to make
The paths of June more beautiful, is thine,
Sweet May! —*H. H. Jackson.*

31. In this broad earth of ours,
Amid the measureless grossness and the slag,
Enclosed and safe within its central heart,
Nestles the seed perfection.
—*Whitman.*

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MAY, one of the most beautiful months of the year. The cold and the rigor of winter have gone, and the unpleasant heat of summer has not yet begun, while vegetation is at its richest and loveliest. As to the derivation of the name of this month, there has been considerable controversy. Perhaps the weight of opinion rests with the theory that the month was named for Maia, the Roman goddess of spring and of increase, but some scholars hold that *May* is but a shortened form of *Majores,* and that the month was so called because it was sacred to the older men, as June was sacred to young men, or *juniores.* The flower of the month is the hawthorn; its special gem, the emerald.

May is the fifth month in the year. Originally it was the third, but when the Romans placed the two newly added months, January and February, at the beginning of the year, it took its present place. It has always been one of the long months, possessing thirty-one days.

May Customs. From the very earliest times the first of May has been a time for out-of-door festivities. In Rome it fell within the period which was sacred to Flora, goddess of flowers, and flower-decked processions were common on that day. During medieval and early modern times in England the customs connected with May Day, as the first of May is called, were interesting and beautiful. On the night before, the children and young people were all excitement, for the Maypole had been erected on the village green, the gayest finery had been made ready, and every girl went to bed hoping that she might be chosen "May queen." In the morning there was the procession to the woods to bring home the "may" or hawthorn blossoms, and with these the Maypole was wreathed. The "queen," chosen by popular vote, set up her court in a little flowery bower, which she left at times to dance with her loyal "subjects" around the Maypole. Tennyson's *May Queen* gives a picture of these rural pleasures.

In recent times the Maypole festivities have had a revival. Many schools give May-day festivals, and attempt to reproduce, so far as possible, the music, the steps and even the costumes of the dancers of earlier times.

In the United States there prevailed a generation or two ago the custom of "hanging May baskets" on the eve of the first of May. Little baskets, elaborate or simple, costly or of home manufacture, were filled with wild flowers and hung upon the door knobs. It was a point of honor, as in the giving of valentines, for the donor to slip away without being discovered.

Special Days. Both Canada and the United States have one important holiday in May. In Canada this is the twenty-fourth, which is known as Empire Day and is set aside as a memorial to Queen Victoria, whose birthday it was. In the United States the thirtieth of May is sacred to the memory of the soldiers who have fought in their country's wars, and is known as Decoration Day or Memorial Day. In these volumes, under the titles DECORATION DAY and EMPIRE DAY, will be found suggestive programs for use on those occasions.

MAYA, *mah'yah,* **INDIANS,** a group of tribes who constituted the ruling race in several Mexican states, particularly Yucatan, and a part of Central America when that section of the North American continent was conquered by the Spanish (about 1520). Over a million of their descendants in Mexico and Central America still speak the Maya language. In the midst of the tropical forests of Yucatan and Central America have been found the ruins of more than forty Mayan towns, connected by paved roads and suggesting a past of splendor and advancement. Their architecture was remarkably beautiful, and the interior decoration was elaborate. Many of the buildings were built about open courts, somewhat similar to the houses of the Pueblo Indians.

The Mayas had a written language, largely pictorial. They tended their farms, wove their own cotton, were skilled in the art of making ornaments of gold and precious stones and excelled in feather work. They erected marvelous temples to their deities, worshiped stone

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idols and sometimes offered human sacrifices. They paid more attention to agriculture than to warfare, and in this point differed from the Aztecs, whom they resembled in many other respects (see AZTEC).

MAY APPLE, an American herb of the barberry family, appearing in wooded tracts in the spring as a single, large-lobed, shield-shaped leaf, and followed later by two similar leaves having a large, pure white flower at their base. It bears a yellow, egg-shaped fruit, edible but with an unpleasant flavor. The root-stalk produces a drug of laxative properties. The May apple is also called the *mandrake* (which see).

MAY BEETLE. See JUNE BUG.

MAYFLOWER, the name of the vessel in which the Pilgrims sailed from Southampton, England, to find homes and religious freedom in the new world, in 1620. The *Mayflower* was a vessel of 180 tons, and was chartered from one Thomas Goffe, a shipping merchant of London, who owned the vessel. In company with her sister ship, the *Speedwell,* she sailed from Southampton on August 5, with 102 persons on board, but the *Speedwell* proved unseaworthy and had to return. After a stormy voyage of sixty-three days the Pilgrims reached a harbor which they called New Plymouth, on December 11, or December 21, according to the new style calendar (see PILGRIMS).

The Honored 102. William Bradford, second governor of Plymouth, wrote a voluminous history of the *Mayflower* adventure (for particulars see BRADFORD, WILLIAM). He gave a list of the passengers, and after thirty years added an appendix which accounted for each person after that lapse of time. The names of those on the *Mayflower* he wrote down as follows:

The names of those which came over first, in ye year 1620. and were by the blessing of God the first beginers and (in a sort) the foundation of all the Plantations and Colonies in New-England; and their families.

Mr. John Carver; Kathrine, his wife; Desire Minter; & 2. man-servants, John Howland, Roger Wilder; William Latham, a boy; & a maid servant, & a child yt was put to him, called Jasper More.

Mr. William Brewster; Mary, his wife; with 2. sons, whose names were Love & Wrasling; and a boy was put to him called Richard More; and another of his brothers. The rest of his children were left behind, & came over afterwards.

Mr. Edward Winslow; Elizabeth, his wife; & 2. men servants, caled Georg Sowle and Elias Story; also a little girle was put to him, caled Ellen, the sister of Richard More.

William Bradford, and Dorothy, his wife; having but one child, a sone, left behind, who came afterward.

Mr. Isaack Allerton, and Mary, his wife; with 3. children, Bartholmew, Remember, & Mary; and a servant boy, John Hooke.

Mr. Samuell Fuller, and a servant, caled William Butten. His wife was behind, & a child, which came afterwards.

John Crakston, and his sone, John Crakston.

Captin Myles Standish, and Rose, his wife.

Mr. Christopher Martin, and his wife, and 2. servants, Salomon Prower and John Langemore.

Mr. William Mullines, and his wife, and 2. children, Joseph & Priscila; and a servant, Robart Carter.

Mr. William White, and Susana, his wife, and one sone, caled Resolved, and one borne a shipbord, caled Peregriene; & 2. servants, named William Holbeck & Edward Thomson.

Mr. Steven Hopkins, & Elizabeth, his wife, and 2. children, caled Giles, and Constanta, a doughter, both by a former wife; and 2. more by this wife, caled Damaris & Oceanus; the last was borne at sea; and 2. servants, called Edward Doty and Edward Litster.

Mr. Richard Warren; but his wife and children were lefte behind, and came afterwards.

John Billinton, and Elen, his wife; and 2. sones, John & Francis.

Edward Tillie, and Ann, his wife; and 2. children that were their cossens, Henery Samson and Humillity Coper.

John Tillie, and his wife; and Eelizabeth, their doughter.

Francis Cooke, and his sone John. But his wife & other children came afterwards.

Thomas Rogers, and Joseph, his sone. His other children came afterwards.

Thomas Tinker, and his wife, and a sone.

John Rigdale, and Alice, his wife.

James Chilton, and his wife, and Mary, their dougter. They had an other doughter, yt was married, came afterward.

Edward Fuller, and his wife, and Samuell, their sonne.

John Turner, and 2. sones. He had a doughter came some years after to Salem, wher she is now living.

Francis Eaton, and Sarah, his wife, and Samuell, their sone, a yong child.

Moyses Fletcher, John Goodman, Thomas Williams, Digerie Preist, Edmond Margeson, Peter Browne, Richard Britterige, Richard Clarke, Richard Gardenar, Gilbart Winslow.

John Alden was hired for a cooper, at South-Hampton, wher the ship victuled; and being a hopfull yong man, was much desired, but left to his owne liking to go or stay when he came here; but he stayed, and maryed here.

John Allerton and Thomas Enlish were both hired, the later to goe mr of a shalop here, and ye other was reputed as one of ye company, but was to go back (being a seaman) for the help of others behind. But they both dyed here, before the shipe returned.

There were allso other 2. seamen hired to stay a year here in the country, William Trevore, and one Ely. But when their time was out, they both returned.

These, bening aboute a hundred sowls, came over in this first ship; and began this worke, which God of his goodnes hath hithertoo blesed; let his holy name have ye praise.

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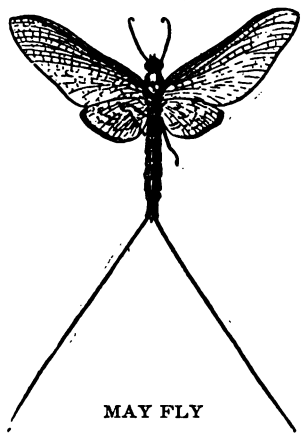
MAY FLY, DAY FLY or **SHAD FLY,** common names for a species of insects that are noted chiefly for the brief existence of the adult; from this characteristic comes the name *day fly*. The traditional belief that they live only a day is erroneous, though probably none exists longer than three weeks. They are fragile, with large forewings, small hind wings and short antennae (feelers). Most species mate during flight, and the eggs are laid in fresh water; the larvae exist for years upon the bottom of the stream, under stones covered with mud. The emergence of these insects from the water seems always to be at evening, and as they are strongly attracted by lights, they appear in great swarms around them. They are excellent bait for fish and are imitated in making artificial flies.



MAY FLY

MAYHEM, *ma'hem,* in law, is the offense of violently and unlawfully rendering a person less able to defend himself or to fight for his country in time of war. If one fears he may be drafted in war he may engage a friend to cut off his "trigger finger," injure his arm or leg or impair his eyesight. The offense is mayhem, and both parties are amenable to the law. In personal altercations, if one combatant bites off his adversary's finger or ear, the offense is punishable as mayhem. Modern statutes regard any crime of violence which results in permanent injuries as mayhem, and hold the author liable to a civil action for damages as well as to criminal prosecution. The word *mayhem* is really an older form of *maim,* and in most places the two words have the same meaning.

MAYO, *ma'o,* William James (1861-) and Charles Horace (1865-), American surgeons and sons of a surgeon, who in a small inland city have won an international reputation. The elder brother was born at Le Sueur, Minn., and educated at the University of Michigan, receiving his M. D. degree in 1883. In the same year he began the practice of surgery in Rochester, Minn. The younger brother, Charles Horace, was born at Rochester, Minn., educated at Northwestern University and Chicago Medical College, and after his graduation in 1888 began to practice in his home town, in partnership with his brother.

The brothers have founded at Saint Mary's Hospital, in Rochester, one of the most celebrated clinics in the world, visited by physicians from Europe as well as from all parts of the United States. Their patients include people from almost every civilized land. The success which the Mayo brothers have attained in their operating is almost phenomenal; a surprisingly large proportion of their patients recover. They have given especial attention to operations so difficult that they were usually regarded as practically impossible. Both brothers are members of the chief American medical and surgical societies, and have received honors both at home and abroad.

In 1915 the Mayo brothers gave to the University of Minnesota an endowment fund of $2,000,000 and their surgical laboratory for the establishment of a great surgical hospital, with the agreement that a portion of the work each year should be conducted in the brothers' hospital at Rochester (see Minnesota, University of).

MAYOR, *ma'er,* the chief executive officer of a city or corporate town in the United States, Canada, Ireland, England, and the British colonies. In the United States the mayor is elected by the qualified voters of the city for a certain number of years (commonly two years, except in smaller cities, where one year is the usual term). The mayor generally appoints all nonelective city officials, subject in most cities to the consent of the council. He is the head of the executive departments, and it is his duty to see that the city ordinances are faithfully enforced. In many cities the mayor exercises a limited veto upon all ordinances passed by the council. In many of the smaller cities, he presides over council meetings, and has a deciding vote in case of a tie. Generally, he issues and revokes licenses, and has the judicial authority of a justice of the peace. The office of mayor is dispensed with in those cities which have adopted the commission form of government or the city-manager plan (see Commission Form of Government; City Manager).

The mayor of an English municipality has less important duties than the corresponding American official. He is supposed to devote much time to duties of a social nature, and to preside over meetings connected with public-welfare movements. His most important administrative function is to act as chairman of

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the meetings of the board of aldermen. He is also *ex officio* justice of the peace. The mayor is chosen by the council, his term of office is one year, and he is eligible for reëlection. The title *lord mayor* is borne by the mayors of the cities of London, Dublin and York. The lord mayor of London has jurisdiction over the ancient inner city alone, and his principal function is to maintain the hospitality of the city. To carry out this duty he is granted an allowance of $40,000 a year and the use of the mansion house.

The heads of councils in Canadian cities are known as mayors, wardens and reeves. Their chief duties are to preside over meetings of the council, to execute the laws passed for the government of the municipality, to supervise the conduct of all subordinate officers, to recommend to the council measures for the improvement of the municipality, and to see that negligent officials are punished. During their terms of office, heads of councils are *ex officio* justices of the peace.

In small cities the mayor's salary is very small; sometimes he serves without compensation. In great cities he is well paid and during his term of office gives his entire attention to the task of governing his city. The highest salaried mayor in the United States is that of Chicago, $18,000. New York City pays $15,000. The mayor of Montreal receives $10,000, the largest amount paid in Canada. W.B.G.

MAZARIN, *maz a raN'*, JULES or JULIUS (1602-1661), a French statesman of Sicilian parentage, who succeeded the celebrated Cardinal Richelieu as prime minister of France. Educated by the Jesuits at Rome and in Alcala, Spain, he entered the Papal service and went to France as the Pope's messenger. Richelieu, prime minister under Louis XIII, thought well of the young Italian and persuaded him to enter the French diplomatic service. In 1632 he became a naturalized Frenchman and in 1641 was made a cardinal.

On Richelieu's death the following year he was made prime minister, and although Louis XIII died in 1643, Mazarin had so firmly intrenched himself in the graces of the queen regent, Anne of Austria, that he continued in that position much against the wishes of the French. Although he was less forbidding and severe than Richelieu, Mazarin continued the great statesman's policy of keeping the entire power in the hands of the Crown, and of unmerciful taxation, carrying out his plans so successfully that he aroused the violent enmity of both the people and the nobles of France. Resistance to his method brought on the civil war of the Fronde in 1648 (see FRONDE). He was twice expelled from court, in 1651 and 1652, but returned in 1653, and continued all-powerful in France until his death, eight years later.

MAZE. See LABYRINTH, for description and illustration.

MAZEPPA, *ma zep'a*, IVAN STEFANOVITCH (1640-1709), a famous hetman, or leader of the Cossacks, whose story has been celebrated in poetry, art and fiction. Byron's well-known lines, from his poem *Mazeppa*, express the admiration felt for him by his companions:

> Of all our band,
> Though firm of heart and strong of hand,
> In skirmish, march, or forage, none
> Can less have said or more have done
> Than thee, Mazeppa! On the earth
> So fit a pair had never birth,
> Since Alexander's days till now,
> As thy Bucephalus and thou.

He was born in Podolia, a district in Western Russia, of poor but noble Russian parents, and became a page in the service of John Casimir, king of Poland. A Polish nobleman, who surprised him in an intrigue with his wife, had him stripped and bound to his own horse. Lying upon his back, and with his head to the animal's tail, Mazeppa was borne aimlessly away. The horse took him to his own home, from which, in shame, he fled to the Ukraine in Southwestern Russia, where he joined the Cossacks. Through his strength and courage Mazeppa rose to high distinction among them, and in 1687 was elected their hetman. He won the esteem of Peter the Great, who made him Prince of the Ukraine, but later he conceived the idea of gaining complete independence for the Cossacks and for this purpose joined Charles XII of Sweden. Mazeppa took part in the Battle of Pultowa, after which he fled to Bender, where he died the same year.

MAZZINI, *maht se'ne*, GIUSEPPE (1808-1872), a celebrated Italian patriot who played a large part in the unification of Italy. He was born in Genoa, studied in the university there, and later practiced law. He had a strong desire to see the various little states into which Italy had been partitioned united under a central government, and early began agitating the subject. In 1830 he joined the Carbonari, and was recognized as so active and dangerous a member that he was exiled from Italy. He lived first in Marseilles, then in Switzerland and later in London, but in each place maintained correspondence with the liberal republican faction

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in Italy and in other countries. It seemed to him that the Carbonari were not accomplishing their purpose, and he organized a new society, Young Italy, of which the object was the overthrow of all the monarchical governments in the peninsula, and the union of the various states under a republic.

In 1848, when revolutions occurred in so many European countries, Mazzini returned to Italy, and helped to organize a republic at Rome. The new government was short-lived, however, and Mazzini again went into exile, at first to Switzerland and later to London. He helped to stir up insurrections in Milan and in Genoa, and was of great assistance to Garibaldi in organizing his expeditions in 1860, 1862 and 1867. When Italy was finally unified under Victor Emmanuel, only one-half of Mazzini's dream had been realized; he had striven for a republic, not for a monarchy, and he refused to enter the Italian parliament, though repeatedly elected. In 1870 he attempted to organize a republican rising in Palermo, but was pardoned by reason of his efforts for a united Italy.

Mazzini was a man of the loftiest personal character, and his work on behalf of his country was free from any suspicion of self-seeking. The wisdom of his opposition to Cavour and the Sardinian monarchy is open to question, but concerning his motives there can be put one opinion.

MEADE, *meed,* George Gordon (1815-1872), an American general, famous as the leader of the victorious Federal army at the Battle of Gettysburg, the turning point of the War of Secession. He was born at Cadiz, Spain, of American parentage, and was educated in the United States. After his graduation from West Point, in 1835, he saw active service in the Seminole War, then resigned from the army and was employed as civil engineer in government surveys. In 1842 he reëntered the army, and during the Mexican War served with distinction under General Taylor. In the War of Secession, first as brigadier-general of volunteers, he took an active part in the conflicts at Mechanicsville, Gaines's Mill, Frazier's Farm and the second Battle of Bull Run, and for his gallantry at the Battle of Antietam he was commissioned major-general of volunteers. General Meade covered the retreat of the Federal army at Chancellorsville, and succeeded Hooker in June, 1863, as commander of the Army of the Potomac. On July 1 he compelled Lee to give battle at Gettysburg, where he won a notable victory (see Gettysburg, Battle of). In Grant's Virginia campaign of 1864-1865 Meade commanded the Army of the Potomac. After the war he had charge of various military departments, including one of the Southern districts during the days of Reconstruction.

GEORGE G. MEADE

MEADOW LARK, *med'o lark,* an American bird, commonly found in grassy fields, meadows and marshes. It is not a true lark, but belongs to the family of blackbirds and orioles, and is about the size of a robin. Its back and wings are of a brownish color, and its throat and underparts are of a bright yellow, conspicuously marked with a black crescent on the breast. Its song is a clear, melodious whistle, and is one of the first to be heard in the spring. Its summer range is from the Gulf of Mexico northward into Canada, and it winters in the Southern United States and Mexico. The meadow lark builds its nest on the ground, frequently arching it over with grasses. The eggs are four to six in number, white in color, speckled with cinnamon and reddish-brown. This bird lives for about ten years.

MEADOW LARK

Consult Chapman's *Handbook of Birds of Eastern North America.*

MEADVILLE, *meed'vil,* Pa., the county seat of Crawford County, and an important manufacturing center, is situated in the northwestern part of the state, on French Creek, ninety miles north of Pittsburgh and thirty miles south of Erie. The Erie, the Northwestern Pennsylvania and the Bessemer & Lake Erie railroads enter the city, and interurban lines extend to towns north and west. The place was settled as early as 1788 and was named in honor of David Mead, one of the first residents. In 1823 it became a borough, in 1866 it was chartered as a city, and in 1913 it adopted the commission form of government, providing for a

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mayor and four councilmen. The population increased from 12,780 in 1910 to 13,802 in 1916 (Federal estimate). The area of the city is two square miles.

Meadville is primarily a manufacturing city, but in addition it is the market for a lumber and grain region, which is also rich in petroleum and natural gas. Here are located the car and machine shops of the Erie Railroad, which employ about 2,000 people. There are also large iron works, manufactories of iron and steel products, silk mills, confectionery factories, printing works and lumber mills. The city has large wholesale houses, and many churches, parks and public buildings. Besides public and parochial schools, it has Meadville Theological School (Unitarian), opened in 1844, Allegheny College (Methodist Episcopal), opened in 1815, Pennsylvania College of Music, and a public library.

MEAFORD, *me'ferd,* a town in Grey County, Ontario, on Nottawasaga Bay, an arm of Georgian Bay. It is 115 miles northwest of Toronto, and lies about midway between Collingwood and Owen Sound, being twenty-one miles by the Grand Trunk Railway northwest of the former and eighteen miles directly east of the latter. The town is the center of an apple-growing district, and among its chief industrial establishments are three apple-evaporating plants and a canning factory. Other important products are boxes, hardwood flooring, furniture, wheelbarrows, flour, blankets and yarns. The harbor accommodates ships drawing not over twenty feet of water, and there is regular steamer connection in season with other lake ports. Population in 1911, 2,811; in 1916, estimated, 3,300.

MEALY, *meel'i,* **BUG,** a troublesome member of the scale insect family, which takes its name from a powdery substance covering its body. This is an excretion of wax in the form of flourlike grains. The mealy bug lives upon tender growths and does great damage to fruit and shade trees. Only the males have wings. The female sheds her skin from three to five times before becoming full grown, and each time the legs, eyes and antennae (feelers) become smaller, while the body increases in size. Finally the power to move is lost, and as soon as she lays her eggs, or after the birth of the young (for the baby bugs of some species are born alive), she dies. Mealy bugs secrete honey dew which the ants seek, and they are frequently carried by the latter from one feeding place to another. Most of these bugs found in the United States have been brought from Europe in importations of fruit and plants. These pests may be destroyed by spraying plants with a tobacco wash or with an emulsion of kerosene.

MEASLES, *me'z'lz,* a contagious disease characterized by a rash upon the skin and by catarrh of the nose and lungs. Although it may be contracted by older persons, it occurs most frequently between the ages of one and five. In most cases a second attack of the disease is not likely to occur. Measles is more contagious than scarlet fever and less so than smallpox. It is spread by mouth and nose secretions, and may be conveyed by contact with infected hands, lead pencils, cups, spoons, etc. The germ which causes it has not been identified.

A week or two after the disease has fastened itself on the victim the first symptoms appear; these symptoms are those that accompany a bad cold, including headache, rise of temperature toward evening, weariness, and running of the eyes and nose. On the fourth day a bright red rash appears on the face, spreading to the neck, chest and extremities. Three days after its appearance it begins to decline, and is followed by a fine, branlike peeling of the skin. The rash in measles differs from that in scarlet fever (which see) in that the former has the tint of a raspberry; the latter is the color of boiled lobster. In measles, too, the rash appears in patches, while the fine eruption of scarlet fever is spread over the body more evenly. A serious and often fatal form called *black measles* is fortunately of rare occurrence.

Treatment. With proper care victims of measles usually recover, but because of the danger of complications, especially pneumonia and bronchial trouble, a physician should be in attendance. Eye and ear afflictions often result from severe cases. The eyes should be protected from bright light, the body from exposure to cold, and the cough be carefully treated. The diet should be light. It is also essential that the bowels receive careful attention. When the rash does not come out well, hot drinks, hot blankets or a warm bath will be found helpful. The patient should be kept warm and quiet for a week or two after the apparent disappearance of the disease, as the lungs and mucous lining of the bowels are then susceptible to attacks of inflammation. A child ill with measles should be kept entirely away from other children during the entire progress of the attack. W.A.E.

German Measles. Some physicians consider this disease, with its run of rather mild fever

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and its rose-colored rash, as a form of measles, but by most authorities it is recognized as a separate disease. The rash, which may be limited to the face, neck and shoulders, or may extend over the entire body, sometimes closely resembles the measles rash and sometimes is more like that accompanying scarlatina. The disease is extremely infectious and most frequently appears as an epidemic, attacking children, especially. As a rule it is not dangerous, but care in guarding against colds and eyestrain is necessary. The patient should be kept in bed, should receive only such light food as is suitable in the case of most fevers, and should be given a mild fever remedy. Unless those in charge of the case are very familiar with the disease a physician should be summoned.

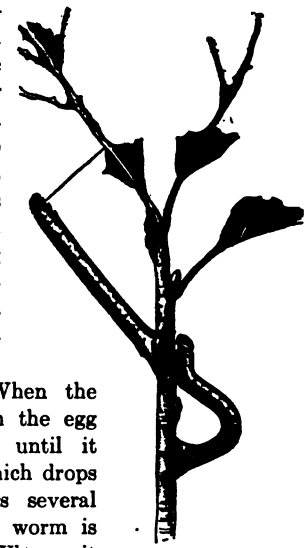
Consult Ruhrah's *Manual of the Diseases of Infancy and Childhood;* Koplik's *Diseases of Infancy and Childhood.*

MEASURE FOR MEASURE, a play of Shakespeare's, called a comedy, but entitled to that name only because it does not close with the death of any of its characters; for it bears throughout an atmosphere of almost unlightened gloom. Indeed, it affords the reader less of pleasure and cheer than most of his tragedies, so persistently does it dwell upon the baser passions of its characters. Only Isabella, sister of Claudio and chosen bride of the duke, is worthy to rank with Shakespeare's other heroines in goodness and in charm.

MEASUREMENT OF INTELLIGENCE, THE. See INTELLIGENCE, THE MEASUREMENT OF.

MEASURING RESULTS OF EDUCATION. See subtitle, in article EDUCATION, page 1933.

MEASURING, *mezh'ur ing,* **WORM,** the caterpillar of a moth belonging to the geometrid (earth-measuring) family, sometimes called a *looper,* because in crawling it brings its hind feet up to the forefeet, thus making a loop of its body and appearing as though measuring the surface over which it travels. It is also able to hold itself straight and motionless away from a branch, and being of a greenish-brown color, it looks in this position quite like a tiny twig. When the grub comes from the egg it eats greedily until it splits its coat, which drops off. This occurs several times before the worm is full grown. When it reaches maturity it burrows into the earth or spins a silky cocoon on the underside of a leaf, where it changes into a winged creature. Some of the members of this family, such as the cankerworms, are serious pests, frequently laying waste whole apple orchards or cranberry marshes. See CANKERWORM.



MEASURING WORMS
At left, projecting at the same angle as a branch or twig; at right, the familiar loop made in crawling.

MEAT AND MEAT PACKING. Meat is the flesh of those domestic animals raised for the purpose of supplying man with food. The people of the world eat forty-seven billion (47,000,000,000) pounds of meat each year. English-speaking people, especially Australians, are the heaviest meat-eating people in the world. However, the steadily-rising prices asked for meat have encouraged the use of substitutes, and less meat is being bought per person than formerly.

Meat consists of muscular and connective tissue and fat. It is more tender in younger animals and in the parts of the body which do not grow tough from muscular exertion. It is most commonly eaten fresh, but is also used

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smoked, salted, dried or canned. The flesh of different animals varies greatly in the amount of fat and proteins contained. Nearly all the protein and ninety-five per cent of the fat in animal food are digested; in vegetable food the amount is less. The length of time taken in the process varies according to the toughness and composition of the meat; pork, for instance, is digested very slowly. But in actual nutritive value, the cheaper cuts are as rich as the more tender.

Meat should be immediately taken from the paper wrapping on delivery, washed well with a cloth wrung out of cold water and placed in a refrigerator. It is cooked in various ways, to loosen and soften the tissues, to help digestion by making it appetizing, and to kill bacteria which may be present. Some kinds of meat must be well-cooked to be healthful.

The number of *calories*, or heat-making units, to each pound, in the different meats and common articles of food of an ordinary meal, are as follows, arranged in order of high calories: Mutton, 1695; pork, 1580; beef, 1040; veal, 690; bass, 465; beans, 1605; bread, 1215; eggs, 765; potatoes, 385, and milk, 325.

Meat Packing

The slaughtering of cattle, sheep and hogs, and the preparation of their carcasses for use as food is one of the greatest of the world's industries. The terms *meat packing* and *packing industry* are somewhat misleading, for the greater part of the products of the industry is fresh meat, which has not, strictly speaking, been packed in any way. The term *packing* was first applied to the slaughtering of hogs and the preparation of their meat for the market, less than ten per cent of the meat being sold as fresh pork. In time, however, meat packing became a general term covering all the operations of preparing meat for the market, in whatever form.

Development of the Industry. The packing industry in America, as distinguished from slaughtering for household consumption, seems to have originated in New England during the seventeenth century, when large quantities of pork were exported in barrels to Europe. The industry spread slowly, and the first packing-house west of the Appalachian Mountains was not established until 1818, at Cincinnati. That city became, and for many years remained, the great packing center, but it was later eclipsed by Chicago, which still leads. Other cities which have become important in this industry are Omaha, Kansas City, Saint Joseph (Mo.), Sioux City, Saint Paul, Saint Louis, Fort Worth and Indianapolis. In the East, New York City, Buffalo and Boston lead, most of their meat products being consumed in the East or exported to Europe. In Canada the centers of the industry are Toronto, Winnipeg, Moose Jaw, Calgary and Edmonton.

Present Importance of the Industry. The slaughtering and meat-packing industry, as usually defined, includes extensive private and municipally-owned establishments, but does not include retail butchers, many of whom still buy live cattle and do their own slaughtering. Even when thus limited it is the greatest single industry in the United States. The 1,600 or more establishments have a total annual output valued at about $1,500,000,000, approximately seven per cent of the total manufactures for

Figures represent millions of dollars.

the country. The plants have over 100,000 employees and a total invested capital of $1,400,000,000. About one-third of the world's supply of meat is slaughtered and packed in the United States. The figures vary from year to year, but the average kill in round numbers is over 12,000,000 cattle, 6,000,000 calves, 14,000,000 sheep and lambs and 50,000,000 hogs. These figures include not only the output of the commercial packers, but also the animals slaughtered privately or locally for domestic use. In Canada the industry ranks fourth among the Dominion's activities, with an average annual product of $45,000,000.

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Organization of the Industry. All of the great packing firms have their agents or buyers in the sections in which live stock is raised. Often the buyer visits farm after farm to select the stock he wants, but he always buys in larger lots from local dealers, to whom the farmer or rancher sells. Sometimes, too, the farmer ships by rail direct to a commission man or broker in the packing centers, where the packers' buyers again appear. In spite of better transportation facilities there is a steady tendency toward decentralization. Long journeys by rail are injurious to the live stock; the animals lose in weight, even on short journeys, and there is evidence that the meat deteriorates. For these reasons, as well as for economy in shipping, the packers have gradually moved their plants nearer the regions in which cattle are raised and fed for the market. This is the meaning of the growth of the meat-packing industry in Fort Worth, Omaha, Moose Jaw and other cities far from Chicago, which latter city is still, however, far in the lead.

Processes. The slaughtering and dressing of cattle and other animals was formerly a slow hand process; now every possible labor-saving machine or device is employed. It takes less than forty-five minutes to kill and dress a steer, and less than eight minutes to kill and dress a hog. This rapidity is made possible not only by machinery but by minute division of labor. As every workman does only one thing, he becomes very skilful.

When the animals reach a packing center they are at once unloaded at the stockyards. Cattle are usually given a day's rest before being slaughtered, but it is not unusual to kill hogs within a few minutes after they arrive. With much shouting and squealing a trainload of hogs will be driven up inclined viaducts to the top of the slaughtering building. There they are swung by their hind legs on a trolley which passes the "sticker," whose business it is to kill the hog. Next the carcass is passed through scalding vats, and then through an automatic scraper, which removes almost all the bristles; the few remaining are later scraped off by hand. Scalded and scraped, the carcass is carried along, head downward, to the men who slit and disembowel it, behead it, and finally wash and trim it. The carcass is then ready for the cooler. A single corps of men can kill and dress twenty hogs a minute.

By the use of ice, ammonia or brine (see COLD STORAGE), the cooling room or cooler is kept at a temperature just above freezing, and here the meat is stored until the animal heat has entirely left it. For pork this means about three days, after which the meat is ready for the various finishing processes. Beef, if it is to be sold as fresh meat, is usually kept in a cooler for a week or ten days, and the best cuts of beef are kept longer, even three weeks. This is done not to give the meat time to cool, but to *ripen* it. Ripening, strictly speaking, is the first stage of decomposition, when the fibers begin to break and soften and the meat becomes tender. Beef which is to be shipped a considerable distance is usually loaded into cars after three days of ripening, because it can be kept as cold in the refrigerator car as in the packing house. So nearly perfect are these refrigerators that fresh meat shipped from the South American port of Buenos Aires, from Chicago or from Fort Worth will reach its destination at Liverpool, Hamburg, Vladivostok, or any other distant point, in first-class condition.

Products and By-Products. The different preparations of beef, mutton, lamb and pork may be conveniently divided into fresh meats, smoked meats, lard and tallow, and such special preparations as canned meats, dried beef and sausages. The variety of pork products is much greater than of other meats. Only ten per cent of the pork is sold as fresh meat, the remainder being made into ham, bacon, sausage, etc. Nearly all beef and mutton are sold as fresh meat (for the cuts of meat, see articles elsewhere on BEEF, PORK, HAM, etc.).

By-Products. Probably in no other industry is there less waste than in meat packing. There is a familiar saying that "the packers use every part of the hog except the squeal." There is also very little waste in the slaughtering of cattle and sheep. The hides are made into leather; the hoofs, bones and other parts not edible are made into glue, soap and oils; the intestines are used as skins for sausages; the blood and offal are dried and sold as fertilizer; the horns and hoofs are made into combs, buttons and handles for knives; the hair of cattle, the bristles of hogs and the wool of sheep are valuable for many purposes. The total value of all by-products in the United States alone is about $300,000,000, or twenty per cent of the total production of the industry.

The story of how these by-products came to be utilized is the story of the success of the meat-packing industry. Competition becoming continually keener made a continuance of the business a question of reducing waste in pro-

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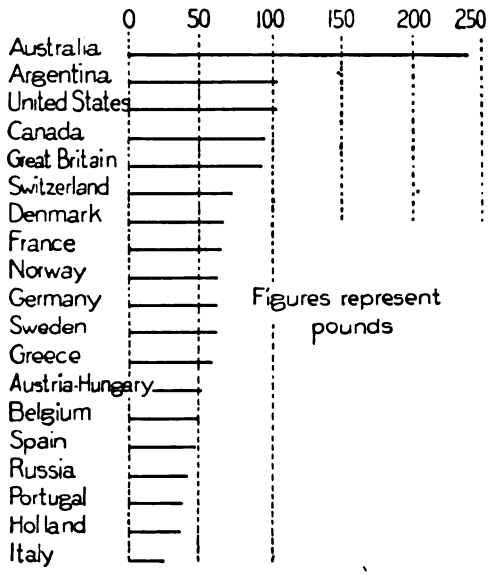
paring meat and of utilizing every possible part of the animal. The use of by-products will doubtless reach greater proportions; the present proportion of this part of the industry was illustrated in 1916 in a direct manner by one Chicago packing house. It prepared an exhibition of by-products obtained from slaughtering



AVERAGE YEARLY CONSUMPTION

The table shows the amount of meat eaten by each person in the countries named, in normal times. (From official reports.)

operations. The wide range of these articles and commodities is the more impressive when it is remembered that not a great many years ago but little effort was made to utilize more than the hides and hair of animals. The following were included in the exhibit:

Pure Ground Dried Blood. This is 17 per cent ammonia, and is used as a fertilizer ingredient.

Oleo Stearine. This is the edible beef fat from which oleo oil has been pressed. It is used in the manufacture of high-grade toilet soaps and candles and for softening leather.

Hoof Meal. Made from ground hoofs and used for fertilizing.

Flake Glue. Made from hides, sinew and bones, and sold to furniture makers, bookbinders and glue manufacturers.

Ox Gall. Used for medicinal purposes.

Thyroid Glands, from cattle, sheep and hogs. These possess medicinal value and are in demand by manufacturers of medical preparations.

Collar Buttons. Made from horns, hoofs and bones.

Shaving Brush Handle. Made from horns, hoofs and bones.

Buttons. Made from horns, hoofs and bones.

White Wool. Scoured, sold to manufacturers of worsted goods, woolen goods, hats, blankets, shoddy goods and knit goods.

Black Hog Bristles. Used in the manufacture of carpet-sweeper brushes and paint brushes.

Horn Pith. This is the inside of the horn and is used as a fertilizer ingredient.

Cattle Tail Hair. This is sold to hair curlers to be curled and is used by mattress makers and upholsterers who need hair longer than hog hair.

Bristles. These are particularly saved from hogs killed in winter, because the hair is longer and heavier during winter months. They are used in the manufacture of all kinds of brushes.

White Tennis Gut. The raw material is furnished to manufacturers of tennis rackets.

Violin Strings. This is made from sheep gut.

Bone. Used very widely by manufacturers of handles, buttons, combs, hairpins and fancy articles, and for the manufacture of fertilizers.

Suprarenal Gland. Used for medicinal purposes.

Lard Oil. This is pressed from choice yellow hog grease and is used principally by nut and bolt makers for keeping dyes cool when cutting.

Thymus Gland. It possesses medicinal virtues and finds sale among manufacturers of druggists' preparations.

Pepsin. Made from linings of the stomachs of cattle and hogs.

Calfskin. Used for shoe vamps and book binding after being tanned.

Sheepskin. Furnished to glove and shoe manufacturers and bookbinders after being tanned.

Pigskin. This is widely used for parts of shoes, particularly insoles, box toes and counters.

Sole Leather. From hides of steers, used by shoe manufacturers.

Ground Glue. Made from hides, sinew and bones.

Plaster Retarder. Composed of pure blood, lime and other ingredients. Sold to builders to retard the setting of plaster.

Government Inspection. In the United States as early as 1890 attempts were made to protect the consumer from diseased or otherwise unfit meat, but not until 1906 was an adequate law put in force. It provided for examination of live animals, of carcasses and also of finished products by inspectors of the Bureau of Animal Industry, a branch of the Department of Agriculture. In Canada the inspection is made under the direction of the Health of Animals branch of the Department of Agriculture. Before the animals are slaughtered they are carefully examined, and any that are diseased or injured are rejected. During the process of dressing, the carcass is again examined, for some diseases which have no visible effect on the living animal can be discovered in the meat. Even after the meat has once been inspected and stamped "Inspected and Passed," it is subject to reinspection at any time; if it has become tainted or otherwise unfit for food it is at once condemned. All condemned meats must be destroyed in the presence of the inspector.

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This rigid inspection makes it certain that all meat which comes from the packing-houses is fit for food. In the United States, however, this government inspection covers only about sixty per cent of the meat production, and in Canada the percentage is about the same. A small additional percentage is inspected by local authorities, but the remainder, slaughtered privately or by local butchers, is uninspected. The percentage of privately-slaughtered meat is steadily growing less, however, and in time will probably constitute a negligible factor in the meat supply. W.F.Z.

Consult Circulars 101, 105, 154, of the Bureau of Animal Industry, Department of Agriculture, Washington, D. C.; Edelman's *Textbook of Meat Hygiene.*

Related Subjects. The reader is referred in this connection to the following articles in these volumes:

Adulteration of Foodstuffs and Clothing	Food
Bacon	Food Products, Preservation of
Beef	Ham
Calorie	Mutton
Chile Con Carne	Pemmican
Cold Storage	Pork
Cookery	Poultry
Diet	Proteids
Digestion	Proteins
Fat	Pure Food Laws
Fish	Sweetbread

MECCA, or **MEKKA,** *mek'a,* the capital of the province of Hejaz, Arabia. Because it was the birthplace of Mohammed it is the great holy city of his followers. It is situated "two camel marches," or about sixty miles, east of Jiddah, its Red Sea port. The valley in which it lies is narrow and sandy, and scarcely any refreshing rain ever falls; its industries are confined to dyeing and the making of articles for sale to pilgrims. The newer part of the city has a modern aspect.

Mecca was given over to idolatry centuries before the birth of Mohammed, but after the hegira (which see) the prophet marched against Mecca, and the inhabitants were forced to accept his new religion as the price of their lives. The sacred mosque encloses the holy Kaaba, which was purged of its idols and became a Mohammedan shrine. At the time of the Hajj, or annual pilgrimage, which Mohammed enjoined on his followers to be taken at least once in their lives, the city is crowded with pilgrims, often to the number of 100,000. This pilgrimage lasts three or four months and is the chief source of the wealth of the inhabitants. Population, about 80,000. See MOHAMMEDANISM.

MECHANICAL POWERS, *me kan'i kal pou'erz.* The six simple machines, the elements of which more complicated machines are made, are the lever, wheel and axle, pulley, inclined plane, wedge and screw. Their mechanical power, or advantage, is the ratio of the effort put forth to do a definite amount of work to the amount of work done. That ratio is either a proper or an improper fraction, expressing the number of times less or greater the force is than the usefulness of the machine. In the former case the work done is much less than the effort put forth, but it is done in much less time; in the latter case the work done is much greater than the effort expended. Very great mechanical advantage, both of time and labor, may be obtained by various combinations of these simple machines. Each of the six mechanical powers is described in detail under its title in these volumes.

THE SIX MECHANICAL POWERS
From left to right: Lever, wheel and axle, pulley, inclined plane, wedge, screw.

MECHANICS, *me kan'iks,* the term applied by Sir Isaac Newton to the science of the construction and use of machines. It now refers to abstract force, motion and stress, without any account of the substance. Mechanics includes the study of the kinds of motion, or *kinematics;* and the causes of motion and changes of motion, or *dynamics,* a term now also applied to the whole subject. *Dynamics* includes *statics,* or the forces acting on a still body; and *kinetics,* or the motion and change of motion of a moving body (see DYNAMICS).

MECK'LENBURG DECLARATION OF INDEPENDENCE, in American history, a series of resolutions said to have been passed at a meeting at Charlotte, Mecklenburg County,

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, on May 20, 1775, asserting that the resi- of the county should thereafter be inde- ent of British rule. The minutes of the ng in which the resolutions were passed declared to have been burned in 1800, but .9 they were reproduced as far as possible memory and published in the *Register* of gh, N. C. The fact that the resolutions ined several phrases almost identical with Declaration of Independence drafted by son and adopted on July 4, 1776, has d doubt to arise as to the authenticity of Mecklenburg Declaration. The subject ıvestigated by the North Carolina legisla- in 1831, and it was declared that the lenburg resolutions bore no resemblance e famous Declaration of Independence. cognition of this conclusion as to the nticity of the document, May 20 was a legal holiday throughout the state, and tatute is yet in force.

CKLENBURG - SCHWERIN, *mek' len (shva reen'*, a grand duchy of the Ger- Empire. It is bounded on the north by Baltic Sea, on the east by the Prussian ıce of Pomerania and the grand duchy

LOCATION MAP

ecklenburg-Strelitz, on the south by the an provinces of Brandenburg and Hano- ınd on the west by Schleswig-Holstein, burg and the state of Lübeck. The Elbe forms its south boundary for a distance ew miles. The country is low and flat, tretches of sand and marsh, but contains good agricultural land and is well watered any rivers, including tributaries of the It has an area of 5,068 square miles er than that of Connecticut) and a popu- of 640,000, ninety-six per cent of which testant. Grand Duke Frederick Francis hed serfdom in his realm shortly before his death in 1837, but Mecklenburg-Schwerin has many semifeudal characteristics. The land is in the hands of the Crown, aristocracy and clergy, but is rented to hereditary tenants. The duchy has many schools and one university, the University of Rostock, with an attendance of 1,000, before 1914. The capital is Schwerin, with a population of 43,131 in 1911.

MEDEA, *me de'a,* according to the Greek myths, was a sorceress who had much to do with the rise to power of Jason (which see). When he came with his Argonauts to the king- dom of her father in Colchis, she helped him to obtain the lustrous Golden Fleece by putting to sleep the dragon which guarded it, and then, fearing her father, she fled with the hero. Her father pursued, and she, to gain time, killed her young brother Absyrtus and scattered his limbs on the sea. On her arrival in Thessaly she put to death by a stratagem Pelias, Jason's uncle, who had usurped the throne, and she reigned with Jason for many years, foiling his enemies by her arts and advancing his interests in many ways. Jason seems not to have found her a comfortable mate, however, for he deserted her for the young Glauce, and Medea in revenge sent to her rival a poisoned robe, in the folds of which she found an agonizing death. As a climax to her evil life Medea killed her own children, and then mounting her dragon car disappeared above the city and was never seen again. The Grecian dramatist Euripides used this story as the plot of one of his greatest tragedies, *Medea,* and it is also the theme of a modern opera by Cherubini.

MEDEA
From a painting by Sichel.

MED'FORD, Mass., a residential suburb of Boston, situated in Middlesex County, in the eastern part of the state, on the Mystic River. Boston is five miles southeast. The Boston & Maine Railroad serves the city, and electric lines connect with Boston and with cities north. In 1630 the place was settled by people from Salem, who called it Meadford, for *Mead ford*

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in the Mystic River. The city, including the villages of South Medford, West Medford, Hillside, Glenwood and Wellington, was chartered in 1892. The population increased from 23,150 in 1910 to 26,234 in 1916 (Federal estimate); the state census of 1915 reported the number of people to be 30,509. The area is eight square miles.

Medford is one of the oldest cities in the state. It contains some structures of historical interest; among these are Craddock House, dating from 1634, the oldest structure in the United States retaining its original form; Wellington House, built in 1657, the Royal House, originally built by Governor Winthrop, and the Old Fort, built in 1630 as a block house, which served as a refuge against the attacks of the Indians. One of the reconstructed colonial residences contains the public library of over 35,000 volumes. Beside these the city has one of the finest armory buildings in the United States; Tufts College, founded in 1852; a $500,000 high school; the library and museum of the Medford Historical Society, which occupies the former home of Lydia Maria Child, the author; the Barnum Museum of Natural History, founded by P. T. Barnum, and the Eaton Memorial Library, donated by Mrs. Andrew Carnegie in memory of her pastor. The Craddock bridge, built across the Mystic River in 1638, was the first toll bridge in New England. In the early days the city was noted for its shipbuilding industry. C.B.G.

MEDFORD, ORE., a city in Jackson County, in the northwestern part of the state, 205 miles south of Eugene and fifteen miles from the California state line. It is on the Southern Pacific, the Pacific & Eastern and the Rogue River Valley railroads. The population in 1910 was 8,840; it increased to 14,118 in 1916 (Federal estimate). The area of the city is nearly three square miles.

Medford is in a beautiful location in the fertile Rogue River Valley, west of the Cascade Mountains. This section is the center of an extensive fruit-growing industry; chief among the fruits raised are apples and pears. Near the town are large tracts of valuable pine timber and ore deposits. Klamath and Crater lakes and National Park are among many places of scenic beauty near the city. The public buildings of Medford include a Federal building, erected at a cost of $120,000, Sacred Heart Hospital, Elks' Club and Carnegie Library. In addition to its public schools the city has Saint Mary's Academy. H.A.L.

MEDIA, *me'di a,* an ancient country in Asia, now included in Northwestern Persia, nearly corresponding to the provinces of Azerbaijan, Ardilan, Ghilan and Irak-Ajemi. It was in the days of its leadership bounded on

MEDIA, ABOUT 600 B. C.

the northeast by Hyrcania and the Caspian Sea, on the south by Susiana-Persia, on the east by Parthia and on the west by Assyria. Media was conquered by Assyria probably as early as 811 B. C., and later joined other nations against the Assyrians. After several expeditions against tyrannical Assyria, the Medes and Babylonians, under Nabopolassar, in 608 B. C. captured and burned Nineveh, the Assyrian capital, and overthrew the empire. The leadership of the Medians was short-lived, however, for in 549 B. C. the Persians, led by Cyrus the Great, conquered them and made their country a part of the Medo-Persian Empire. See CYRUS.

MED'ICAL SCHOOLS, institutions for the education of physicians and surgeons, have existed in all countries of advanced civilization since the time of Hippocrates, four hundred years before Christ. In modern times they are usually connected with universities. The methods of instruction vary greatly in different countries, and in the United States and Canada in different schools. German schools are largely under government control, and the theoretical side of the training is emphasized. British doctors have until recently received their instruction by personal association with practicing physicians, but with modern advance in laboratory needs, it has become necessary to organize schools. In France, the clinic, or attendance of students during the actual practice of doctors, is most in favor. Switzerland was the first nation to admit women to its medical schools.

United States and Canada. In America there are schools of all sorts. The best of them give thorough theoretical training, have excellent laboratory equipment and good clinical instruction. On the other hand, nearly half of the schools are decidedly inefficient. Some lack laboratories, and others have no clinical

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ities, but they are able to provide sufficient : knowledge to enable students to pass written examinations of the state boards. ıin the last few years many of the low- e schools have been forced out of exist- ; of over 450 schools founded, only about survive.

ıe usual degree given to graduates of med- schools is Doctor of Medicine (M. D.), and ordinary length of the school course in ·rica is four years.

Doctor's Qualifications. The profession of icine is not an easy path to riches, neither it indulge hope of comparative ease. A essful doctor must be a hard and constant ter. He has little personal liberty, and t be ready to serve at any hour of the day ıight. Moreover, he must be a constant ent, or the advances in medical science will him by and he will fall into the ranks of inefficient. When patients place their lives ıis hands he betrays a trust who fails to ı informed. It is quite generally recog- d that the true physician is something be- ; a dispenser of drugs. The genial and lly man who brings cheer into the sick n, who gives a word of encouragement when ill help, and who is not afraid to tell his ents the truth if he finds nothing the mat- with them, is the successful doctor of ay. A further requirement is openmind- ess, the ability to abandon old theories, no ter how cherished, when the advance of ıce shows them wrong.

ealizing that the necessary qualities are e liable to be found in men and women of ation, some American medical schools now ıire their students to have completed a ege course, and a constantly increasing ıber demand a partial college training, be- admitting them for study. In Europe, cially in England, the standard is not so ı, though superior to that of the poorer ıols of this continent. S.C.B.

EDICI, *med'e chee,* a celebrated family of ence which had an important part in the ory of Italy and France. Fortunate ven- s in trade brought them wealth, and by the teenth century they had risen to prominence the Florentine Republic. COSIMO (1389- ı) was the first to win wide fame. He was beral patron of the arts and of literature; ed, the Medici almost all had this trait, it was due largely to them that Florence ıme a brilliant center of intellectual and stic life. Cosimo's appeal to the pride of the Florentines was so great that they called him the "Father of his Country," and seemed not to perceive that he robbed them gradually of all their liberties.

Lorenzo the Magnificent (1449-1492), the grandson of Cosimo, was the most famous of the name. He won the gratitude and love of all classes in the state by encouraging literature and art, founding institutions of learning and raising Florence to a foremost place among the Italian states. But while the people were given over to luxury and refinement, Lorenzo himself drew more and more of the powers of government into his hands, until he was practically absolute.

Under Lorenzo's son, Pietro, the Medici were removed from power in Florence, but they were reinstated in 1512, and in the next year a member of the family was raised to the papal throne as Leo X. Again in 1527 the Medici were driven from Florence, only to find their way back to power in 1530. Other members of the family who rose to great prominence were the Popes Leo XI and Clement VII, and Catharine, who became the wife of Henry II of France and during the lives of her three sons practically governed the country. In the seventeenth century pronounced signs of weakening character were visible in the family, which finally became extinct in 1737.

Consult Horsburgh's *Lorenzo the Magnificent;* Vaughan's *Medici Popes, Leo X and Clement VII.*

MEDICINAL PLANTS. Long ago, before men became interested in plants from a scientific point of view, they found that certain of them were helpful in curing illness or injury. Just how this knowledge first came to them we can only conjecture. It was probably accidental—perhaps some man with an injured foot, wrapping it in leaves to keep it from contact with the ground, found that the leaves not only protected, but helped to cure; and once the idea was suggested, other experiments would inevitably be made. At any rate, medicinal plants were the first which were definitely studied, and the earliest students of plant life were not botanists but physicians. Treatises on plants employed in medicine appeared many centuries before any systematic classification was thought of. Throughout medieval times almost the only medicines were brews of various herbs, and to-day a large proportion of the drugs in common use are prepared from plant parts. An extensive list appears at the end of the article MEDICINES AND DRUGS.

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MEDICINE AND DRUGS. Men, women and children have to be fed; else they die. They cannot stand like a rock or house, nearly unchanged for months or years. Unless they daily rebuild their bodies by eating parts of animals and plants and by drinking water, human creatures soon go to pieces.

But we do not need the same food at all times. When we are thirsty we need cool water; when we are cold we need to be warmed by hot food and drink. When we are young we live mostly on milk, but when we grow up this is not sufficient; we need other food as well. When we are sick we need to eat things different from the things we take when we are well—very strange things, sometimes. Among these strange things are the parts of plants or animals or minerals that we call medicines or drugs. As long as he is physically whole a man does not need a wooden leg, but if a cannon shot has carried away his foot it is very much easier to walk with a false foot of wood fastened to his stump than to walk with a crutch.

When Medicines Are Beneficial. So it is in sickness. The healthy man does not need drugs, but in illness they sometimes help. For instance, in the front of everyone's neck, below the Adam's apple and beneath the skin, is a little bunch of flesh called the thyroid gland. Out of it comes a juice like the sap of a tree. That juice flows into the blood and is carried all over the body. It makes our bodies grow and keeps our skin, hair and nails healthy. Sometimes the thyroid gland does not work and this juice is not supplied to the body. Then the skin gets dry and cracked. The hair falls out, the nails break off, and the whole body becomes stunted and weak. About thirty years ago it was found that when a man sick with this disease was given some of the thyroid gland taken from the sheep—eating the glands in little dried pills—the sheep's gland filled the lack in the sick man's body and he got well. His bald head sprouted new hair, his skin grew soft and natural, and everything began to go right again. But as long as he lived he was forced to eat a little of a sheep's thyroid every day; else within a few days he was sick again.

This sheep's thyroid is a medicine (or a drug—the two words mean the same), and it is one of the very few medicines yet discovered which really cure the disease for which it is taken. Yet in one sense even this drug does not cure but only holds the disease in check. One or two drugs are better still. They really cure. Quinine, for instance, is a drug which cures malaria. Malaria is a fever caused by a minute animal which gets into the blood through the sting of a mosquito. This animal is so small that many of them could stand side by side on the point of a pin. The mosquito's sting is hollow and the malaria "germ," as it is sometimes called, swims out through the hollow end while the mosquito is biting us and into our blood, where it has broods of young which attack and eat the blood until we get sicker and sicker.

Now about the time that the first settlers came to America it was found (some say by the monks) that the bark of a tree growing in Peru contained a bitter substance, quinine, which cured malaria if the bark was made into a sort of tea and given the sick man to drink. When the juice of the bark gets into the blood of anyone who is sick with malaria, it poisons the malaria germs and kills them so that the sick person can get well. Nowadays we do not give the bark itself but boil out of it a white, bitter powder which looks like table salt. This is what kills the malaria germ. The rest of the bark is of no use, to speak of, and we throw it away.

Quinine is one of the best of medicines because it kills the malaria germs without doing any important damage to the patient while on its way to kill the germ. Most medicines are more or less harmful to the sick person as well as to his disease. In other words, most medi-

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cines are more or less poisonous and have to be used in very small amounts and for a few days only; otherwise, they may produce another sickness as bad as the one they were given to cure.

The poppy, whose brilliant flower we all know, yields a juice which when dried will put one to sleep and stop almost any pain. But it is also a poison, and if it is taken for more than a few days it poisons the body so that new pains are produced by the drug itself. These pains call for more opium to stop them, then more pain is produced and so on till the body gets what we call a "drug habit"—a craving for the drug. This is very hard to get over, as the body gets so dependent on the drug that it cries out in pain whenever the drug is stopped. Thus in time a person may die of the very medicine given him as a cure.

The leaves of the purple foxglove, a well-known flowering plant, make a medicine that is of great use to people who are sick because their hearts do not work well. Used at the right time and in the right amount, this medicine makes the sick heart do its work better for months or even years. But if too much of this foxglove leaf is taken, it will kill the patient within a few hours. Most medicines are like this in case they do any good at all. They are poisons if taken in too large amounts or if taken for the wrong disease or for too long a time.

How the Body Makes Its Own Medicine. Our bodies often make medicines inside themselves after they get sick, and most diseases get well in this way without any *outside medicine* at all. It is the greatest mistake in the world to suppose that whenever we are sick we need medicine. Very few diseases are to be cured and not many to be helped materially by any of the medicines yet discovered. Among the few really curative medicines are those formed by the body itself. Sometimes the body forms more than it needs for its own use. Then we can take some of the extra supply for the use of other people whose bodies do not form enough.

When a person is just getting over the disease that we call diphtheria, his blood contains an extra supply of the medicine which his body has just made to cure itself. If, then, we take some of his blood and give it to another person still very sick with diphtheria and not having in his own blood enough medicine of his own to cure him, we may be able to help him win the victory over his disease. It is simpler, however, to give a horse diphtheria and from *his* blood get the medicine for men. Horses bear diphtheria very easily if it is given them in the right way. They hardly feel sick at all. Yet their blood makes quarts of the medicine to cure diphtheria in human sickness. By drawing off a small quantity of the horse's blood, now and then, for a few months after he has had his diphtheria, we can get quite a store of medicine and keep it in bottles ready to be given as soon as a child falls sick with diphtheria.

Even this medicine—one of the most perfect yet found—is sometimes a little poisonous and once in a great while very poisonous indeed.

Vaccination. Vaccination means giving a person another disease like the smallpox which we want to prevent—but so mild that the vaccination itself does not make us very sick. It is only a sore arm for a few days and then we are all right. Yet this trifling disease makes so much medicine in our own blood—so much of the medicine that prevents smallpox—that for years afterwards there is still enough left in the blood of anyone who has been vaccinated to prevent his catching smallpox. This means that if the smallpox germ happens to get into our bodies it is killed off at once by the medicine which our bodies have made and kept flowing in our blood.

So we can protect people against the disease called typhoid fever by giving them a very small dose of dead typhoid germs. Even dead typhoid germs make us a little sick for a day or two. In that time enough medicine for typhoid is produced in our bodies to last us for one or two years and to kill off any typhoid germs that we may take into our stomachs in that time with our water and our milk.

Medicines Dug Out of the Earth. Most of the drugs now used come, as has been stated above, from plants and from animals. But some are metals dug up out of the earth. Mercury, for instance, which we all know from seeing it in the tubes of thermometers, is a very powerful medicine against diseases caused by germs which grow in a spiral like a corkscrew—germs called *spirochaetes*. But mercury is also a powerful poison and cannot be given long without doing more harm than good.

Ordinary iron is a good medicine for some of the diseases which makes people's blood thin or watery and their faces pale. It often fails to cure, but one of the good things about iron is that it is almost impossible to get poisoned by it in any serious way.

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Medicines Usually Do Not Cure. In some diseases we give medicines, not with any hope of cure, but simply to help us bear the discomforts until the body forms its own medicine inside itself and cures the disease for us. In rheumatism, for instance, we have no drug which cures, but we can get from willow bark a drug called *salicin* which relieves the pain of the disease so that we are more comfortable while waiting for our bodies to manufacture their own medicine and stop the disease. Willow bark does not shorten the disease, rheumatism, at all, but it makes it much easier to bear.

Sometimes people's stomachs get too acid. A very sour, biting liquid (which is always there) is formed too fast and irritates the inside of the stomach. Now there are medicines which take away the bite and irritation of an acid just as cold water takes away (for a minute) the bite and irritation of sunburn. These medicines are called alkalies. *Alkali* and *acid* are opposites, as heat and cold are. Either will check the other. So when people's stomachs are too full of acid we give an alkali (cooking soda, for instance) as medicine, and when their stomachs are not acid enough, we put acid in, because a little acid makes it easier to digest our food.

Neither acid nor alkali cures stomach trouble. The cause behind the overacid or underacid condition is still untouched, and often cannot be touched by any of our "outside medicines," but only by the medicines which the body itself will usually make if we give it time and rest and fresh air. Air itself is something between a food and a medicine. Part of it is given off from the leaves of plants, and when we breathe it in we have to thank the plants for it. What we breathe out the plants in turn take in and use to build up their own leaves and stems.

One of the most valuable of all medicines is one that we have to breathe in and get into our bodies through our lungs, as we do the air. This medicine is called *ether*. It is invisible, like air, and rises from the surface of a colorless, watery-looking fluid, just as steam rises from hot water. Ether, like most drugs, does not cure any disease, but puts us to sleep and makes us insensible to pain, so that a surgeon can cut into our bodies with a knife, cut off a leg or sew up a wound or do whatever needs to be done.

Before ether was discovered, soon after the year 1800, people had to bear the pain of surgical operations or get along somehow without them. Now the patient feels nothing until the surgeon has finished his work and the effect of the ether has died out. Unfortunately, like most drugs, ether does some harm along with much relief to pain. When we breathe it into our lungs it irritates them, makes us cough and sometimes stirs up disease germs in the lungs—germs which the body's own medicine had nearly killed off. Stirred up by the ether, they may come to life and cause serious lung trouble. No one with weak lungs should ever take ether. On strong lungs it has almost no bad effects.

Dangerous "Secret Remedies." One of the worst things a person can do for his health is to take any medicine which is a "secret remedy." Unless one knows what a medicine is and what it is to do within the body, he may be taking poison. No cook would put into the food she cooks any ingredient that she knows nothing about. But inside our bodies there is going on all the time a sort of cookery which can easily be made to go wrong and to produce poisons within us if we drink medicines about which we know nothing except what the maker tells us in his advertisements. Many "patent medicines" contain so much alcohol that they are merely expensive forms of whisky. It is always a foolish thing, sometimes a dangerous thing, to take any "patent medicine" or any "secret remedy." Before taking any medicine one should always find out from a doctor just what it is and whether it will do good.

Above all, let it be repeated that for at least nine-tenths of all diseases the best medicines are those that the body itself makes. This means that most diseases cure themselves or are cured by nature, not by doctors or by their medicines. Some drugs are useful because they help us to *bear* the disease though not to *cure* it, but in many diseases our man-made drugs cannot do even this. Doctors themselves take very little medicine when they are sick. Others should follow their example and not expect the doctor to give them medicine for most diseases.

If medicines are necessary they need very seldom be nasty. That is an exploded idea. Most medicines can be so covered in with gelatin and sugar that we swallow them without tasting them at all. It may take a little more money or a little more trouble to get medicines put up in tasteless form, but it can usually be done.

Never take a medicine without a doctor's directions. Never take one without under-

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standing what it is for and whether the doctor would take it himself if he had the same disease. Do not expect medicine to cure disease, except in rare instances. Do not forget that most medicines are either useless or poisonous if taken for more than a few days. Persistent drugging is usually bad. R.C.C.

Important Connected Articles. The reader will receive much more information of value in connection with this subject by reference to the following articles in these volumes:

Education, subtitle
Hygiene of Education
Health Habits
Life Extension
Mental Handicaps

Related Subjects. Titles of articles in these volumes relating to medicine and drugs are as follows:

Acetanilid
Aconite
Allopathy
Anesthetic
Antidote
Antipyrene
Antiseptic
Antitoxin
Arnica
Asafetida
Astringent
Belladonna
Bitters
Boneset
Calomel
Cascara
Catechu
Caustic
Chamomile
Chiropractic Healing
Chloral
Chloroform
Cinchona
Cocaine
Cubebs
Disease
Disinfectants
Dogbane
Elixir
Emulsion
Epsom Salts
Ergot
Ether
Formaldehyde
Fumigation
Gargle
Germ
Hartshorn
Homeopathy
Hydrotherapy
Hygiene
Hypodermic Injection
Hyssop
Inoculation
Iodine
Ipecac
Jalap
Laudanum
Lunar Caustic
Materia Medica
Morphine
Nux Vomica
Orthopedics
Osteopathy
Pancreatin
Pathology
Pepsin
Pharmacopoeia
Pharmacy
Phenacetine
Quinine
Salol
Salts
Salts, Smelling
Sarsaparilla
Sassafras
Scammony
Sedative
Seidlitz Powders
Serum Therapy
Skin Grafting
Snake Root
Sorrel
Spikenard
Stramonium
Strychnine
Styptic
Tartar Emetic
Therapeutics
Tonic
Toxicology
Toxins
Vaccination
Veterinary Medicine
Virus
Witch Hazel

PHYSICIANS

Eustachio, Bartolommeo
Galen, Claudius
Gall, Franz Joseph
Galvani, Luigi
Gorgas, William Crawford
Hahnemann, Samuel Christian
Harvey, William
Hippocrates
Jenner, Edward
Kane, Elisha Kent
Keeley, Leslie
Koch, Robert
Lister, Sir Joseph
Mayo, Charles H. and William J.
Mesmer, Friedrich A.
Morton, William James
Morton, William T. G.
Nordau, Max Simon
Paracelsus
Rush, Benjamin
Simpson, James Young
Virchow, Rudolf
Whitman, Marcus

MED'ICINE HAT, a city in Alberta, in the southeastern part of the province, about twenty-eight miles west of the Saskatchewan boundary. It is popularly known as the "Gas City," from the abundance of natural gas in the vicinity, and Kipling once styled it "the town that was born lucky." It is on the main line of the Canadian Pacific Railway, 180 miles southeast of Calgary, 258 miles west of Moose Jaw, and 657 miles west of Winnipeg. The Canadian Northern Railway is building a branch line from Medicine Hat to Hanna, a division point on its Saskatoon-Calgary branch. Like most of the cities of Western Canada, Medicine Hat has had a remarkable growth, its population increasing from 1,570 in 1901 to 5,608 in 1911; in 1916 it was 9,269.

Medicine Hat lies in a rich farming region, and is an important flour-milling center, the combined capacity of its mills being 8,000 barrels a day. Linseed oil, clay and cement products, pumps, farm implements and other machinery are among the chief products of the city's industrial establishments. In spite of its numerous mills and factories, Medicine Hat is absolutely free from smoke, and presents a neat, clean appearance. This condition is due to the use of natural gas, which gives off no smoke, for heating, lighting and manufacturing purposes. The Medicine Hat district is said to be the greatest natural-gas field in the world. The city itself owns about twenty wells, and also the electric light and water systems, the latter installed at a cost of more than $1,000,000. Conspicuous among the public buildings are the fine post office, the armory, a large Roman Catholic convent and the general hospital. Medicine Hat is often referred to by Americans and by Canadians from the East as an exceedingly cold place in winter, but the fact of the matter, as shown by the reports of the Dominion Meteorological Service, is that its average winter temperature is considerably higher than that of many other Canadian towns in the same latitude.

MEDICINE MAN. See INDIANS, AMERICAN.

MEDINA, *ma de'nah,* a city in Arabia, one of the holy cities of Islam, held in extreme veneration by the Mohammedans, since it contains the tomb of the Great Prophet, Mohammed.

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THE WORLD'S EARLIEST CIVILIZATION WAS NEAR ITS SHORES

It is second only to Mecca as an objective point for pilgrims. In this city the prophet carried on his labors after his flight from Mecca. Medina, encircled by walls, is situated in a fertile plain about 250 miles northwest of Mecca, and was formerly the capital of the Islam Empire. See HEGIRA; MECCA.

MEDITERRANEAN, *med i ter a' ne an,* **SEA,** a great irregular inland sea lying between Europe, Asia and Africa, covering an area of 2,484,000 square miles, over five times that of all of the Great Lakes.

As is implied by its name, which is derived from the Latin *medius,* meaning *middle,* and *terra,* meaning *earth,* it was anciently the center of the world's life and commerce. The Phoenicians, the boldest navigators of the ancient world, sailing its length and through the Strait of Gibraltar, turned back, says a legend, leaving an inscription upon the rocks reading *"ne plus ultra"* (no more beyond).

This sea was the highway which brought the Asiatic colonists to Greece, Rome and Carthage, and for over 3,000 years it was the great thoroughfare of the world. The oldest works of classic literature describe the wanderings of the Greeks and Romans upon the Mediterranean waters and shores. Every great power of the ancient world bordered the Mediterranean or its smaller seas, the Tyrrhenian, Adriatic and Ionian seas surrounding Italy; the Aegean, east of Greece, and the Black, or Euxine Sea, on whose straits was situated the ancient city of Byzantium, now Constantinople. The islands of Cyprus, Crete and Sicily, which broke the journey from Greece and Rome to Asia and Carthage, and Sardinia and Corsica, between Italy and Iberia, were important as trade centers. The ancient galleys of Carthage, Greece and Rome battled upon Mediterranean waters for the world's supremacy. The narrow pass of Gibraltar, where a great fortress has been built by nature, was the only entrance open to barbarian ships, and the ancient powers were thus safe from outside invasion.

Since the opening of the Suez Canal in 1869 the Mediterranean has been the great artery of Europe-Asiatic trade. When Napoleon occupied the town of Suez in Egypt, he conceived the idea of the canal joining the Mediterranean and Red seas, opening a route to Asia by way of the Indian Ocean. Over 4,000 vessels now pass through the canal each year. The importance of the Mediterranean as a trade route has caused the expansion of European powers into Northern Africa. During the great War of the Nations, which broke upon the world in 1914, the Mediterranean again became a center of warfare. The fleet of England and France occupied the sea in the northeast, near the Bosphorus, where against the Turks the great naval battles of the Dardanelles were fought without success. Germany lined the sea with mines and submarines for a distance of 500 miles, sinking not only ships of war, but also neutral liners.

The calm, blue waters and beautiful shores of the Mediterranean have long been the winter playground of Europe. From Nice, in France, to Genoa, in Italy, the famed Riviera stretches (see RIVIERA). E.D.F.

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'DIUM, a term revived by the practices dern spiritualism to indicate the specially- red person through whom it is claimed rious phenomena and messages from the world are transmitted. The term is con- l with the ancient idea of specially- red persons (like the ancient oracles), but particularly with the susceptibility dis- l by the subjects of mesmerism or animal etism. See HYPNOTISM; SPIRITUALISM.

DULLA OBLONGATA, *me dul'a ob long* See BRAIN; NERVOUS SYSTEM.

DU'SA, in Greek legend, one of three ters of the sea-god, Phorcys, known as the *ms,* whose home was on the shore of an where the sun never shone. Stheno and le, the sisters, were immortal, but Medusa ortal, and in her youth was very beauti- She boasted of her beauty to the goddess e, who through jealousy changed her into ster with brazen teeth and claws and with ts for hair. She became so hideous that ho beheld her were turned into stone. s cut off her head, which Athene placed e center of her shield. See PERSEUS; TOLOGY.

DUSAE, *me du'see,* tiny jellyfish shaped n umbrella or bell, each with a short cen- tem and several pairs of slender coiling s which trail in the water. It is from the blance to the head of the horrible Gorgon sa with the snaky locks (see MEDUSA) his little animal is named. The eggs de- into creatures which attach themselves to or seaweed and grow to cylindrical polyps, in turn bud, almost like plants, into other s, until a branching colony is formed. the medusae swim away from the latter m new groups. Scientists now apply the to the free-swimming stage in the devel- nt of any animal belonging to the group includes the hydra, sponge, sea anemone, see COELENTERATA).

ERSCHAUM, *meer'shawm,* a porous nce that resembles white clay and is so that it will float on water. From this pe- ity it received its name, which is the Ger- or *sea foam.* Meerschaum is a compound gnesium, silica and oxygen. It is obtained ge quantities in Asia Minor, where it oc- n small lumps in masses of clay. It is chiefly in the manufacture of tobacco ; these are white in the bowl when new, olor a rich brown by continued use and l handling; when the bowl is warm the must not touch it. Meerschaum pipes of good quality sell at prices ranging from $3 to $15. An inferior variety found in Spain is used for a building stone.

MEGANTIC, *me gan' tik,* the county town of Frontenac County, Quebec, formerly known as, and still popularly called, "Lake Megantic." It is situated in the extreme southeast part of the province, on the north shore of Lake Megantic and about twenty miles north of the United States boundary. Steamers ply between the towns and summer camps on the lake and on Chaudière River, which issues from the lake at Megantic. The town is the terminus of one line of the Quebec Central Railway, and is also served by the Halifax-Montreal short line of the Canadian Pacific. Megantic is 115 miles south of Quebec, 175 miles east of Montreal and seventy miles east of Sherbrooke. It is an important tourist center, especially for summer visitors to the Maine woods, but is also commercially noteworthy for its large pulp and saw- mills. Population in 1911, 2,399; in 1916, estimated, 3,000. D.L.L.

MEGAPHONE, *meg'a fohn,* a form of speaking trumpet used to make the voice carry far- ther than ordinary speaking distances, or to direct sound to a given point in greater volume. The name comes from two Greek words, *megas,* meaning *great,* and *phone,* meaning *sound.* One form of megaphone serves to help slightly-deaf people to hear, the other to help increase the range of the voice. The megaphone that as- sists in hearing was invented by Edison for deaf people or persons listening to far-off sounds. Two large funnel-shaped receivers collect the sound-waves, which are carried to the ear by tubes. The other is the familiar funnel-shaped horn used by a person who wishes to make his voice heard a great distance or in a place where there is considerable noise. Sailors use it in hailing other ships or in speaking through fogs; on the stock exchange market quotations are called through a megaphone; and one sees these instruments at the mouths of announcers in front of amusement tents.

MEISSONIER, *meh so nyay',* JEAN LOUIS ERNEST (1815-1891), a French painter, among the first to practice microscopic or miniature painting in oils. Great detail and finish is char- acteristic of all his work. While illustrating books for Paris publishers as a means of live- lihood, he perfected his art, and then exhibited in the Salon year after year. The subjects of his best-known works are historical and mili- tary. Among the most famous is a set of four, the *Napoleon Cycle,* one of which is called *1807.*

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It is owned by the Metropolitan Museum of New York, and the sum of $66,000 was paid for it. Meissonier received unusually high prices for all his work. He was born in Lyons, but spent most of his life in Paris, where he died.

MEISTERSINGERS, *mi'ster sing erz,* the German form of *mastersingers* (which see).

MEKONG, *ma kong',* **RIVER,** or **CAMBO'-DIA RIVER,** the largest stream of the Indo-Chinese peninsula. Rising in the Kuenlun Mountains in Thibet, it flows in a southeasterly direction along a course of 2,800 miles and discharges by several mouths into the China Sea. At Pnom Ponk, in Cambodia, a branch extends in a northwesterly direction to the Tonle Sap (Great Lake). At various points along its middle course rapids and sandbanks occur; these interrupt navigation, and vessels therefore use it as a waterway for only a short distance above its delta.

MELANCHTHON, *me langk' thun,* PHILIPP (1497-1560), a German reformer, the associate of Martin Luther in the Protestant Reformation, was born at Bretten in Baden. While his fame rests upon his connection with the great religious crisis named, he was before that "the schoolmaster of Germany," a great educator who established many schools in the spirit of the modern normal school. His family belonged to the middle classes, bearing originally the name Schwarzerde *(black earth),* which, according to custom, he changed to its Greek equivalent upon entering the University of Heidelberg. He received his bachelor's degree there at the age of fourteen, and the master's degree at Tübingen three years later. His knowledge of Greek led to his appointment as professor at the newly established University of Wittenberg in 1518. There his lectures became immensely popular, and criticism because of his youthful appearance soon turned to admiration of his unusual ability.

PHILIPP MELANCHTHON

Through Luther's influence he began to champion the cause of the Reformation, and the two became closely united at the "Leipzig Disputation" in 1519, when they confronted their opponent, Dr. Eck, and ably defended their cause.

Melanchthon's literary work changed g ally from absorption in classical studies t more urgent interests of theology, his ou of which were published in 1521 under the of *Loci Communes.* He assisted Luth translating the Bible; his insistence on acc was an important factor, set, as it was, a the forcefulness and greater beauty of Lu style. The *Apology* appeared in 1531; in justified the Augsburg Confession of the ous year. In all things he was farseein moderate.

The last years of his life were clouded l deavors to heal breaches between the foll of Luther and of Calvin, between the "I pists" and the strict Lutherans, and eve tween the fiery spirit and teachings of I and himself. His life was not dramatic, for demanding progress, he was opposed to r tionary changes; he was a peacemaker, a of powerful intellect. Striving constantl Christian unity, his greatest hope was tha churches might be of one mind in Christ.

Consult Schaff's *Creeds of Christendom;* ard's *Philipp Melanchthon.*

MELANESIA, *mel a ne' shi a,* a name plied to a group of Pacific islands lying t east of Australia. Melanesia is one of th visions of Oceania, and the islands includ it are shown on the colored map accompa the article OCEANIA.

MEL'BA, NELLIE (1865-), an Austr operatic soprano singer, classed with the most musical artists of her day. She was in Melbourne, where she began her mu education, and later studied under the fa Madame Marchesi, in Paris. Her début was made in Brussels, in 1887, in the opera of *Rigoletto.* She first appeared in America at the Metropolitan Opera House, New York, in 1893, where she sang the leading rôle of *Lucia di Lammermoor,* and she has made operatic concert tours in all the leading countries o world. Madame Melba has sung with no success the soprano parts in *Hamlet, R and Juliet* and *La Traviata.* She appear the latter opera during the 1915-1916 seas

MADAME MELBA

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the Chicago Grand Opera Company. Though she lacks dramatic gifts of the highest order, her voice is unsurpassed for purity and sweetness of tone. Her family name was Mitchell, which she discarded for Melba, the latter being suggested by the name of her native city. In 1882 she married Charles Armstrong, an Englishman.

MELBOURNE, *mel'burn,* a manufacturing and shipping center of first importance, capital of the Australian state of Victoria, and next to Sydney the largest city in the Commonwealth. It is situated about 500 miles southwest of Sydney, on the Yarra River, which flows into Hobson's Bay. This bay is a northern bend of the spacious harbor on the southern coast of Australia known as Port Phillip, the entrance to which is about forty miles from the city. Along the shores of the bay the Melbourne suburbs extend for over ten miles, but the city proper lies about three miles inland on the north bank of the Yarra. The suburb of Port Melbourne, two and a half miles from the business center, is the chief port, but vessels of twenty-two-foot draft can sail up the Yarra to the heart of the city, which has an interstate trade of nearly 3,000,000 tons a year. The tonnage of vessels entering the port from foreign countries is about 690,000 a year.

Melbourne is a busy, prosperous place of modern aspect. The state railway system of Australia has its center in this city. The principal streets are ninety-nine feet wide and are substantially paved and well kept, and the residents enjoy the advantages of gas, electric lighting, a good water system and street tramways. No other city of the same size has such splendid public buildings as Melbourne. Among these are the magnificent Parliament House, crowning one of the two hills on which the city is built; the Treasury building; the law courts; the post office and other government buildings; and a spacious structure housing the public library, national gallery, technological museum and sculpture gallery. Parks, pleasure grounds, public gardens and commercial buildings of imposing architecture add much to the attractiveness of the place. Avenues, gardens and parks are adorned with numerous statues and monuments, including one erected in honor of Queen Victoria.

Melbourne is the residence of an Anglican bishop and a Roman Catholic archbishop, and both of these religious bodies have erected fine cathedrals; the Scots, the Wesley, the Independent and the Baptist churches are also noteworthy. The city's educational interests are represented by the university, which occupies several acres about a mile from the business center, Trinity, Ormond and Queen's colleges, various high schools and academies under denominational or private control, and numerous state schools. Industrially the city and suburbs are in a flourishing condition; among the important industries are tanning, wool washing, bacon curing, flour milling, brewing, brickmaking, iron founding and the manufacture of pottery, candles, cigars, jewelry, furniture, boots and shoes, clothing and woolen and leather goods.

In 1835 a little settlement occupied the site of the city, which consisted a year later of only thirteen buildings. By 1841 a town of 11,000 had grown up, and after the discovery of gold at Ballarat in 1851 its population rapidly increased. Melbourne became the capital of Victoria when that state was organized (1851), and in 1901 it was made the temporary capital of the Australian Commonwealth (see AUSTRALIA, subhead *History*). Population of city proper and suburbs in 1913, estimated, 651,000. B.M.W.

MEL'FORT, a town in Central Saskatchewan. It is on the Winnipeg-Prince Albert line of the Canadian Northern Railway, 494 miles northwest of Winnipeg, eighty-five miles west of Hudson Bay Junction, and sixty-two miles east of Prince Albert. A branch line from Melfort to Humboldt is under construction. The town is the distributing and shipping point for a rich agricultural district; its principal industrial and commercial establishments are grain elevators, lumber yards, farm implement agencies, hardware and general stores, machine shops and a government creamery. The shipment of hogs, horses and cattle is an important business. The Dominion government building and the $60,000 high school are attractive structures. Melfort has a Dominion lands office, and is a customs port of entry. Population in 1911, 599; in 1916, estimated, 1,800.

MELILOT, *mel'i lot,* the name of a group of cloverlike plants belonging to the pea family, commonly called *sweet clover.* Two species, white and yellow melilot, are familiar residents of the waste lands and roadsides of the United States, Europe and Asia. The tiny drooping flowers, which resemble their cousins, the pea blossoms, are delightfully fragrant and attract large numbers of insects, especially the honeybee. These flowers are used in the manufacture of toilet water and perfumery, and dried branches of the plant will give a pleasing scent to a room.

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The blue melilot, native to Northern Africa, is cultivated in Switzerland and the Tyrol and is used for medicinal purposes. Its flavor is also imparted to the Chapzieger cheese of Switzerland, and when the cheese is made in large quantities the odor of melilot can be discerned even at a distance. Sometimes the herbage is fed to cattle, but the plant is generally considered a troublesome weed.

MELODRAMA, *mel o drah' ma,* originally a dramatic performance alternated with vocal and instrumental music, the name being a combination of the Greek *melos,* meaning *song,* and *drama,* meaning *play* or *action.* The term is now used to designate a romantic play which depends on unnatural situations and sensational incidents for its interest, and is applied very commonly to plays that find favor in theaters of the cheaper class, whose audiences enjoy thrilling episodes involving persecuted heroines, wicked villains and hairbreadth escapes. Dramas of tense action which possess real merit, such as William Gillette's dramatization of the *Adventures of Sherlock Holmes,* may be classed as melodrama of a higher order.

MELON, *mel' un,* the name applied to the fruit of several varieties of plants belonging to the gourd family, all of which have climbing or trailing vines and large leaves. The best-known melons are the *muskmelon* (including the *cantaloupe*) and the *watermelon.*

Related Subjects. The reader is referred to the following articles in these volumes:

Casaba	Muskmelon
Gourd	Watermelon

ME'LOS, or **MILO,** *me' lo,* an island possession of Greece, situated in the southwestern part of the Aegean Sea, and famed as the place where the statue of Venus of Melos was found in 1820 by a peasant. The island is thirteen miles long and eight miles wide, and has an area of about sixty square miles. It was settled by the Dorians at an early date and taken by the Athenians in 416 B.C. The present population is 4,864. See VENUS DE MILO.

MEL'ROSE, MASS., a suburb of Boston, situated seven miles north of that city, in Middlesex County, and on the Boston & Maine Railroad. Interurban lines connect with Boston and with cities and towns in the northeastern part of the state. The city has a location adjoining Middlesex Fells, a state reservation of 1,800 acres, famous for its natural beauty. Although it is a residential suburb, the city has manufacturing establishments, the most important of which are devoted to the making of boots, shoes and rubbers. Melrose, wh cludes the villages of Melrose Highland and Wyoming, was settled as early a Until 1649 it was a part of Charlestow from that time until 1850, when it wa porated as Melrose, it was a part of I In 1900 it received the city charter. Th lation increased from 15,715 in 1910 to 1 1916 (Federal estimate). The area is five square miles.

MELT'ING POINT, or **FUSING,** *fu* **POINT,** in physics, is the temperature a a solid substance melts or becomes liqui required temperature is hardly the s any two substances, and varies from for ice to 3231° F. for platinum. In n is found that the greater the purity th the temperature of the melting point iron melts at 3099° F., gold at 1072°, 418°, tin at 320°, lead at 324°, silver a aluminum at 1341°. Mercury when s melts at a temperature of forty degre zero.

MEL'VILLE, a town in southeast katchewan. It is a passenger and freig sional point on the main line of th Trunk Pacific Railway and also on the Melville branch, which is projected to with the Hudson Bay Railway at Pa 279 miles northwest of Winnipeg, 18 southeast of Saskatoon and ninety-eig northeast of Regina. Melville is the c a prosperous farming region, and with ception of the railway shops all its in business interests are dependent on agr

The town owns and operates a hosp a skating and curling rink as well as it works and electric-light system. It is of a judicial district and of a Luther lege. The town hall, which was comp 1912, cost $75,000. Melville is the point on the Grand Trunk Pacific's m for the Qu'Appelle Valley, where there fishing and hunting. The town was fou 1907, and was named for Charles I Hays, then president of the Grand Tr cific. Population in 1911 was 1,816; in was 2,100.

MELVILLE, *mel' vil,* **ISLAND,** an i the Arctic seas north of the American co belonging to the group discovered in Captain William Parry, a British navig lies north of Melville Sound and I Prince Patrick and Bathurst islands. It irregular in shape, about 200 miles long miles wide. From April to the end

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and flowers grow, but the rest of the it is ice-bound—the home of the reindeer musk ox. Deposits of coal have been d on the island, which is of lime and sand- formation.

ELVILLE PENINSULA, *mel'vil pen in'* , a wild, desolate peninsula of North rica, extending north of Hudson Bay, in North West Territories of Canada. The Isthmus connects it with the mainland, separated from Cockburn Island on the h by Fury Strait and Hecla Strait, and Baffin Land on the east by Fox Channel. discovery of this region should be credited ne early expeditions of Sir John Franklin, ough it was named by Sir William Parry, passed the winter of 1821-1822 on the nsula and was the first white man to ex- it.

EMBRANES, *mem'braynz,* derived from a n word *membrana,* meaning *parchment,* is term applied to thin sheets of elastic tissue h cover and line various organs and cavi- of the body. Among the most important *mucous, serous* and *fibrous* membranes.

ucous Membranes line those passages which ı externally and through which matter is n into the body or eliminated from it. y are soft, velvety and of a dark-red color, secrete a clear, sticky fluid (see MUCUS) h keeps the membranes moist and flexible serves to protect them. The mucous mem- es form the lining of such parts of the body he mouth, the alimentary canal, the inner ıces of the eyelids and the Eustachian s. Some of them secrete not only mucus, other fluids for special purposes. These ial secretions are represented by the saliva the gastric and pancreatic juices, which digest the food (see DIGESTION).

rous Membranes are those which line cavi- not in open communication with the air. largest and most important of these, the *oneum,* is a thin, closely-woven network ells covered by a single layer of flat cells. nes the abdominal cavity and also covers outside of all the abdominal organs, help- to hold them in place. It is kept moist by ıid produced by the lymphatic circulation LYMPH), and its smooth surface permits organs of the abdomen to move easily. er important examples of serous membrane the lining of the sac around the heart (the *cardium*) and that surrounding the lungs *ura). Synovial membrane* is the name ap- l to a form of serous membrane which lines the cavities of the joints. The synovial membrane secretes a fluid resembling the white of an egg, the purpose of which is to moisten and oil the joint so it will turn smoothly and easily.

Fibrous Membranes are not moistened by a fluid, but add to the strength of the parts they surround, and are represented by the *periosteum* around bones, the *dura mater* on the inside of the skull and the fibrous membrane of the spleen. The periosteum not only covers bones, but it affords an attachment for muscles, carries blood vessels and nerves, nourishes the bone and reproduces its cells. S.C.B.

MEM'LING, or **MEM'LIC,** HANS (1430?-1494), one of the early Flemish painters, notable for the great number of his canvases. His works are noted for their accuracy, grace, beauty and tenderness of feeling; however, he had a tendency of crowding many figures into one scene, which often marred the unity of his conception. He was a pupil of Van der Weyden, whom he surpassed. His most noted works are sacred subjects, including *The Last Judgment, Seven Sorrows and Seven Joys of the Virgin, Marriage of Saint Catharine, Adoration,* several Madonnas, and fourteen small paintings that adorn the shrine containing Saint Ursula's relics at Cologne, Germany. Very little is known about Memling. He was born at Bruges, where he spent most of his life. Many of his paintings are still to be found there, the most notable being the decorations for the Hospital of Saint John.

MEM'NON, in Greek legend, the son of Tithonus and Eos, and king of the Ethiopians, whose kingdom was on the west bank of the Nile. He went to help his uncle, Priam, against the Greeks, after the death of Hector. Among his valorous deeds was the slaying of Antilochus, but he was slain himself by Achilles before his warriors could come to his aid. Zeus, taking note of the tears of his mother, bestowed immortality upon him. Every morning his mother wept for him, and the sparkling dew drops were said to be her tears. See TROY.

The "Vocal Memnon." One of the colossal statues of Amenhotep III, set up at Thebes by one of the Pharaohs, which, becoming popularly known as the *Vocal Memnon,* acquired a wide fame. Each morning it emitted musical sounds when the sun's rays touched the statue. This action was probably due to the passage of air through the damp, porous stone, caused by the sudden change of temperature at early sunrise; however, the impressionable natives

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believed the sounds to be Memnon's morning greeting to his mother. The musical notes ceased after the statue was restored by Severus.

THE "VOCAL MEMNON" AT THEBES

MEMO'RIAL DAY. See DECORATION DAY.

MEMORY, *mem'o ri.* Occasionally there is a person who possesses a power of memory which seems to others little short of miraculous. Lord Macaulay could repeat accurately a long poem after hearing it read once, and it is said that had all copies of *Paradise Lost* been destroyed, he could have restored the poem from memory. There was "Blind Tom," too, who could listen to an extended and difficult musical composition and then reproduce it note for note on the piano. Other people, reading of such prodigies, are likely to feel discouraged and to exclaim, "I have no memory;" but such a statement cannot be true of any normal human being. The man who had "no memory" would not know his father and mother or recognize his own face in the mirror; he would not realize when he was thirsty that it was water he needed, or that letting the sunlight into a room would banish darkness.

A Definition. Memory is the power which the mind has to revive past experiences and to be conscious of the fact that it has had them before. In the article on HABIT there is a reference to the fact that the nervous system has a tendency, when it has once acted in a certain manner, to act in that same manner again, and memory is but another phase of that same tendency. The second part of the definition above, however, shows the distinguishing feature of memory—the recalling of the past impression must be *conscious.* Sometimes a person, because of some shock or accident, has impressions wiped from his mind as completely as writing is erased from a blackboard. When he starts to readjust himself to life he may find himself possessed of a tendency to do certain things—he may shrink instinctively, for instance, from high places; but if this shrinking does not recall to him the fact that he once fell from such a place, the experience is not in the fullest sense a memory. The same case brings out another interesting distinction. The man has lost his *memories*—that is, he can revive no impressions from his past; but his *memory* may be unharmed. Everything which has happened since his accident he may recall perfectly, and he may be able to learn a poem or master the details of a period of history as well as he ever could.

Memory, Imagination and Recognition. Students of the mental processes—psychologists, we call them—used to believe that memory was a special mental power and had a part of the brain all to itself, but further study has shown that this is not so. It is, instead, connected with every mental process, every feeling, every sense perception. Thus one may remember the taste of an orange, the scent of a jasmine, the sound of the latest popular song, the color of the house in the next block, the train of reasoning by which a certain result was reached, or the grief which a sad announcement awakened.

Two other mental processes are closely related with memory—*imagination* and *recognition;* but there are distinctions. Memory and imagination are alike because both deal with objects which are not present to the senses; the garden seen yesterday is to-day just as nonexistent to the eyes of the one who saw it as is the fanciful Garden of Eden which he amuses himself by imagining. But with the memory of the observed garden there comes a feeling of familiarity—there were trees here, flowers there, a fountain in the center; while in the imaginary picture all is strange and new. It is the sense of familiarity, then, that distinguishes memory from imagination.

This feeling of familiarity recognition has in common with memory, but recognition demands an actual object, present at the time, while memory may deal with something seen once and never to be seen again.

Verbal Memory and Logical Memory. Many a child learns the multiplication table perfectly and can repeat it easily from "two times two are four" to "twelve times twelve are one

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hundred forty-four," and yet if he be asked suddenly "How much is seven times nine?" he may be unable to tell until he has run over in his mind the table of sevens. Many a child, too, learns such a poem as Bryant's *Robert of Lincoln,* yet could tell nothing, off-hand, of the appearance and the habits of the bobolink. This is mere mechanical memorizing—"learning by heart," as the children call it—and if too much indulged in is likely to retard the development of the reasoning powers.

In *logical* memory, on the other hand, dependence is placed, not on the power to recall mere words in a certain order, but on the organization and orderly arrangement of ideas. The rules in grammar or arithmetic are remembered, not because "the book says so," but because there is an appreciation of the underlying principles which work out in these rules. The latter form of memory is the higher, but the verbal, or mechanical, memory is by no means to be despised. Sometimes people, just because "learning by heart" is so often abused, affect to scorn a mere "memory for dates," but if properly used this kind of a memory may be of the greatest help. Macaulay, whose extraordinary powers were mentioned above, could never have been the remarkable historian he was had he not had an excellent mechanical memory. He read everything that came to his hand—not just the things which stood on everybody's bookshelves, but obscure historical publications and manuscripts; and years afterward, when in his writing he had need of a certain fact he could not only state it, but tell the volume and often the page whereon the original was to be found. He combined with his verbal memory a logical memory, and the result was unusual mental strength.

On the other hand, mechanical facility sometimes exists as a sort of a freak in minds which have no other element of strength. A person who is little more than half-witted may be able to repeat a number of meaningless syllables or a list of unrelated numbers after hearing them once. Blind Tom, whose marvelous musical memory attracted the attention of the world, was subnormal in other respects.

Helping the Memory. On the whole, the importance of a reliable memory is so obvious, not only during the preparatory years which are spent in school or college, but in the later years of business or home activity, that students have spent much time devising methods of cultivating the memory. The art known as *mnemonics* is a rather formal or mechanical way of assisting the memory. It consists of the formation of various devices or associations which will make recall easy. Almost everyone, for instance, remembers the lengths of the months by means of the little jingle:

> Thirty days has September,
> April, June and November;
> All the rest have thirty-one,
> Excepting February alone,
> Which has but twenty-eight in fine
> Till Leap Year gives it twenty-nine.

And students of history are familiar with the roughly-metrical list of the sovereigns of England which begins—

> First William the Norman, then William his son,
> Henry, Stephen, Henry, then Richard and John.

But of course to remember dates or other facts in this way there must be some actual device connected with each one, and it is often as difficult to recall the device as the thing to be remembered by it. Good memory always depends upon:

Attention. This is one of the primary factors in memory, and no one can have a really good memory who cannot concentrate his attention. Teachers dealing with young people are frequently amazed to find how little they retain of a paragraph read over; and this is usually because the habit of attention has never been cultivated. Closely allied with this is *interest;* anyone is certain to give attention to anything in which he is vitally interested, and the teacher or parent should do all he can to broaden and deepen the interests of the child. See ATTENTION; INTEREST.

Reproduction. Reproduction of what is read is important. The teacher or parent cannot find a more helpful exercise than that of having children give in their own words, either orally or in writing, the substance of something which they have read or studied.

Training all Senses. This brings up another point. Some people remember best what they have seen, some what they have heard; in other words, some people have a *visual,* some an *auditory* memory. But almost always that thing is best remembered which is gained through more than one sense. That is, if a child has heard a poem recited, has read it himself, and perhaps has written it out, he is far more likely to remember it than if he had merely read it. If a pupil seems to remember things only when he has seen them, he should be required occasionally to reproduce something which he has heard read, while the child with the strong auditory memory should be

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called upon to repeat what he has himself seen on the printed page.

Memorizing. There has been much argument regarding the value of memorizing, as to whether or not it is really helpful; the conclusion has been reached that all depends on the method employed. If a child sees the reason for memorizing a certain thing, if he understands the content and can, if necessary, give the substance in his own words, memorizing is distinctly beneficial, but a child should never be allowed to commit to memory what is to him wholly meaningless, as this leads to slovenly habits of thought; but in after years we derive great pleasure and benefit from gems of literature memorized in childhood, although at the time they were learned we could not fully understand them. Nor should a child ever be allowed to memorize a lesson and repeat it glibly in the words of the book when the subject is such a one as history, for instance, where it is entirely the content and not the form which is of importance. See PSYCHOLOGY. A.MC C.

Consult Watts' *Economy and Training of Memory;* Meumann's *The Psychology of Learning.*

MEMPHIS, *mem'fis,* an ancient capital of Egypt, about twelve miles south of Cairo. It is said to have been built by Menes, Egypt's first king, as his capital, and that he turned the course of the Nile to make more room for it. Menes named the city Men-nofer, which means *a place of good abode,* but the Greeks corrupted it into Memphis. Owing to its favorable location the city became rich and powerful, and its old palaces are described as being of remarkable beauty. Other classical buildings were the temples of Isis and Ra, the latter being the temple of the Sun. After the fall of Thebes, Memphis became the capital of Egypt, and the second city in the land in population. After the Arab conquest the decline of the city was rapid, and Cairo was partially built of stones taken from the deserted buildings. Nearly all traces of the city had disappeared in the first part of the nineteenth century, only two colossal statues of Rameses II being found on the site which marked the entrance to the temple of Ptah. For location, see map of EGYPT, page 1969.

MEMPHIS, TENN., an important city on the Mississippi River, at the head of deep-water navigation, is the county seat of Shelby County, situated in the extreme southwestern part of the state. It is the largest city in the state and the largest city on the river between New Orleans, 739 miles south, and Saint miles north. Memphis is growing r 1910 the population was 131,105; in 1 148,995 (Federal estimate). About cent of the inhabitants are colored.

More than 175 steamers, whose ho Memphis, ply between Memphis and Gulf ports. The Chicago, Rock Isl cific, the Frisco, the Illinois Central, ville & Nashville, the Nashville, Ch & Saint Louis, the Saint Louis, Iron & Southern, the Saint Louis Southw Southern and the Yazoo & Mississipp enter two large passenger terminals, and Grand Central stations. Freigh within the city is effected by two A great iron cantilever bridge, the across the river from the Gulf to the the Ohio, was completed in 1892 at $3,000,000. A second and larger b under construction in 1917.

Memphis has an area of twenty squ It is situated on the east side of the an elevation known as Chickasaw Bl is forty feet above high water. A w extends along the river front. The cit attractive by wide, well-paved and w streets and fine residences and public

Parks and Public Buildings. There acres in woodland parks, a fairgroun acres and two race courses. Over (335 acres), which has the Brooks Art Gallery and Zoölogical Gardens, (427 acres) and other parks are con boulevards and parkways. In the cen business section is Court Square, in w bust of Andrew Jackson. The promin ings are the customhouse and po erected in 1885 at a cost of $1,500 courthouse, containing also the cit costing $1,500,000; the police hea which cost $250,000; the Cotton Exch the Merchants' Exchange; Cossitt other public libraries, and a market h

Institutions. Memphis has the Wes see State Normal School, the medic ment of the University of Tennessee, Institute and two schools for negroes, nibal Medical College and Le Moyn Institute. There are, besides, man schools. Other important institution Baptist Memorial Hospital, one of in the South, the United States M the Municipal hospitals.

Commerce and Industry. The c and industrial importance of Mempl

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to its year-round deep-water navigation and its location in a rich cotton and lumber belt. As the largest interior cotton market of the United States, and one of the largest in the world, it handles more than 1,000,000 bales annually. It is also one of the largest hardwood lumber markets, producing one billion feet a year, a great cottonseed-oil producing center, and one of the most important mule and horse markets of the South. There are three stockyards and a meat-packing house. Extensive wholesale houses annually distribute more than $24,000,000 worth of groceries, foodstuffs, clothing and drugs.

Among more than 600 manufacturing establishments are wood-working factories; foundries and car shops; machine shops; cooperage, fiber, pulp and paper mills; rice mills; harness factories; engine and boiler works, and manufactories of cotton gins, pottery, stoves, ranges and cider presses.

History. The earliest explorers found Chickasaw Indians on and about what is now the site of Memphis. Here they lit their council fires and embarked to cross the river. During the seventeenth century the place was visited by Marquette and Joliet, La Salle and De Tonti. In 1739 the first French fort was built, but throughout the eighteenth century the Spanish contested the French claim to the lower Mississippi. In 1797 Fort Adams was built by United States troops, and soon after the Indians were expelled. General Andrew Jackson, Judge John Overton and General James Winchester, owners of the property, organized a small settlement in 1819, which was incorporated as a town in 1826 and received a city charter in 1849.

Epidemics of yellow fever in 1855, 1867, 1873, 1878 and 1879, during which time thousands died and thousands more fled for safety, so impoverished the city that to avoid bankruptcy the state legislature, in 1879, repealed the city charter and created the Municipal Taxing District of Shelby County. A complete system of sanitation was installed, the indebtedness was bonded, and in 1893 the city charter and name were restored. The city water supply is obtained from artesian wells owned and operated by the municipality. In 1909 the commission form of government was adopted. J.M.T.

Consult Young's *History of Memphis.*

MEMPHREMAGOG, *mem fre ma' gog,* a picturesque small lake on the boundary between Canada and the United States, about one-third of its area being in the state of Vermont and the remainder in the province of Quebec. It is about thirty miles long from north to south and from two to five miles wide. Memphremagog is noted for its attractive scenery and its excellent fishing, and its shores are dotted with summer resorts and private villas. Newport, Vt., at the southern end, and Magog, Quebec, at the northern, are the principal settlements. Through the Magog River the lake discharges northeastward into the Saint Francis River, which reaches the Saint Lawrence at Lake Saint Peter.

MENDELSSOHN-BARTHOLDY, Jakob Ludwig Felix (1809-1847), commonly called Felix Mendelssohn, a famous composer, was born at Hamburg, Germany. His parents were converted from the Jewish to the Christian faith when Felix was but two or three years old, and he himself was baptized in the Lutheran Church. The family was wealthy and cultured, and there was never a day in Mendelssohn's life that he lacked those things which money and broad education could give. When he was two years old Hamburg was captured by France, then at war with Germany, and the Mendelssohn family fled to Berlin, a city which he never liked, but which he always considered his home.

He began to receive music lessons from his mother when he was but four years old, and five years later was composing short pieces for the family orchestra, consisting of his brother, two sisters and himself. When he was sixteen the family moved to a beautiful mansion in Berlin with a seven-acre park about it, and there in a garden-house seating several hundred people concerts were held that were the admiration of the whole city. In the course of time thousands of visitors from many parts of the world attended these entertainments, and the photographs sent by distinguished persons who had enjoyed the music filled forty-seven volumes.

MENDELSSOHN

When the boy was but fifteen years of age he composed and directed a three-act opera of such beauty that the most crabbed musician in Berlin, called, for his spitefulness, "Old

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Zelter," arose in the audience and compared him to Haydn, Mozart and Bach. Mendelssohn's father then sent him on a three-year tour of Europe to gain ideas from other musicians. He went first to London, where he played his *Symphony in C,* written when he was but fifteen, and so pleased the audience that many people leaped upon the stage to congratulate him. In June of that same year, 1829, he played in London the overture of his *Midsummer Night's Dream,* written before his seventeenth birthday, and again the audience showed extraordinary enthusiasm. In later years he gradually added musical settings for the various scenes in the famous Shakespearean drama until the entire play was described in music. It is in this composition that the famous *Wedding March* is to be found.

When he was twenty-four years old he was appointed director of public music for Düsseldorf, Germany, but two years later removed to Leipzig to direct the public concerts. He was greatly admired by the music-loving citizens; the university of the city conferred upon him the honorary degree of doctor of philosophy; he suggested and organized the famous Leipzig Conservatory, the greatest music school in the world. Life indeed seemed full of profitable and pleasant work for him. In 1835, however, he suffered a severe loss in the death of his father, and his sorrow caused him to compose *Saint Paul,* one of the greatest of oratorios. Mendelssohn, though still very young, was beginning to show signs of premature old age; overwork had made him irritable, and the unappreciative attitude of his home city, Berlin, increased his natural sensitiveness. But there seemed to be no decrease in either the quantity or quality of his compositions. In 1840 he was commissioned by the Leipzig authorities to compose the music for the four hundredth anniversary of the invention of printing, and the result was his marvelous *Hymn of Praise,* excelled perhaps only by Beethoven's *Ninth Symphony.* Because of this work he was chosen general superintendent of sacred music throughout the kingdom of Prussia. In 1845 he resigned all positions to devote his entire time to composing, and near the close of that year finished his most famous work, the oratorio *Elijah.* It was first presented at Birmingham, England, on May 26, 1846, and gained a reception never equaled in the history of oratorio music.

In the midst of such triumphs came the death of his beloved sister Fanny, and in his stricken condition he wrote the pathetic *Violin Quartet in F Minor,* probably the most sorrowful composition in all music. His grief seemed to increase, and in October, 1847, caused a stroke of apoplexy. He lingered until November 4, when his death occurred at Leipzig. Memorial services for the beloved musician were held in practically every large city of both Europe and America. R.D.M.

Consult Rockstro's *Mendelssohn,* in Great Musicians Series; Hadden's *Life of Mendelssohn.*

MENDICANT, *men'di kant,* **ORDERS,** communities of religious men who renounce all worldly possessions and accept the vows of poverty, chastity and obedience. Though the term *mendicant* is associated with begging, it was not the original idea of the founders of the Orders that they should subsist by alms, but by manual labor, and resort to solicitation only when labor became impossible. With the growth of cities and communities, spiritual ministrations increased, self-support by personal work became difficult and the dependence upon contributions of the faithful increased. Subsequently, however, the practice of receiving alms declined or was abolished. These Orders were instituted in the thirteenth century and have spread steadily throughout the West, where they have responded to the religious, intellectual and artistic needs of society by founding colleges and institutions of learning. The Dominicans, the Franciscans, the Augustinians, the Carmelites and the Servites are the most prominent of this class of Orders.

MENDOZA, *men do'sah,* the most important inland city of Argentina, South America, and capital of the province of the same name, is beautifully situated at an elevation of 2,500 feet above sea level, 160 miles east of Valparaiso, in a rich agricultural district in the northern part of the province. Mendoza is the center of the grape and wine industry of Argentina, 100,000 acres of vines being cultivated in the vicinity. It is also the transfer point between Buenos Aires, 647 miles to the east, and the Pacific coast. Connection with Chile is obtained by the Trans-Andean Railway. The city is progressive, having schools, colleges, banks and beautiful public buildings. It was visited by an earthquake in 1861, when 10,000 lives were lost. Population, 1915, about 62,000.

MENELAUS, *men e la'us,* a character in Greek mythology, who was a son of Atreus, brother of Agamemnon and husband of the beautiful Helen of Troy. The happy married life of Menelaus and his wife came to a sudden

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end when Paris, the son of Priam, king of Troy, visited them, fell in love with Helen and persuaded her to elope with him to Troy. Menelaus, aided by the Greek chieftains, sought revenge; thus came about the famous Trojan War. After ten years he recovered Helen and started back to Sparta with her, but the two had displeased the gods and were in consequence driven by storms to other shores. At last they reached their native land safely. There they took up their reign and "lived happily ever after." See HELEN OF TROY; TROY.

MENHADEN, *men ha'd'n,* or **MOSS'-BUNKER,** a salt-water fish, from twelve to eighteen inches long, which has received possibly more variations in name than any other fish in American waters. Among its numerous names are *yellow-tail, bunker* and *pogy.* In color it is bluish above, and silvery on the sides. It may be found from Nova Scotia to Brazil, and is by far the most abundant fish on the eastern coast of the United States. As a food fish for the table the menhaden is not so highly valued; but its flesh is packed in oil, after the manner of sardines, for domestic and foreign consumption, and salted menhaden is also found on the market. As a source of valuable oil it is of great commercial importance, and from the part left after the oil has been extracted a fertilizer is manufactured. It is also unexcelled as a bait fish in the cod, halibut and mackerel fisheries. These fish swim near the surface in unwieldy masses, and all the large fishes feed upon them, the tunny being the most destructive.

MENINGITIS, *men in ji' tis,* a general term for a number of serious maladies characterized by inflammation of the membranes covering the brain and the spinal cord. Of the different forms the most appalling is *cerebrospinal meningitis,* an infectious disease that has occurred as an epidemic at various times in Europe and America. *Cerebral* meningitis is acute inflammation of a membrane of the brain (the *pia mater*), and occurs in two forms—tubercular and simple, of which the former is more common to children than adults. *Spinal* meningitis affects the membranes of the spinal cord. All forms are very dangerous and often result fatally. See BRAIN.

Epidemic Cerebrospinal Meningitis, inflammation of both the brain and the spinal membranes, is caused by a specific germ which has been found in secretions of the nose, eye, bronchial tubes and joints, and in the blood. The winter and spring months are the most common seasons for epidemic outbreaks, and the disease claims the greatest number of victims in squalid tenement districts, where dark, narrow alleys and sunless rooms offer favorable conditions for the spread of the infection. Crowded, insanitary barracks occupied by soldiers, and famine-infested districts are other favorite breeding-grounds of the germ. This kind of meningitis is especially prevalent among children. In its worst form it attacks its victims very suddenly, and death often results in a few hours.

The germ works its way into the membranes, setting up a violent inflammation. Almost unendurable pains rack the head, and every nerve becomes abnormally active, making the surface of the body sensitive to the lightest touch. The body often breaks out in an eruption of dark, purplish spots, whence the name "spotted fever." The muscles contract and become rigid, drawing the head and neck backward and sometimes almost doubling the spine upon itself. Wild delirium accompanies these symptoms, which are followed by coma, paralysis, and in most cases by death. Until the discovery of the meningitis serum (see subhead below), doctors could do no more than administer soothing drugs, such as morphine, and endeavor to allay the anguish of the sufferer by applying ice caps to the head. Often recovery was more to be dreaded than death itself, for blindness, deafness, imbecility and paralysis were common after-effects.

Flexner's Serum. In 1905, when an appalling epidemic of cerebrospinal meningitis was at its height in New York City, Dr. Simon Flexner was appointed a special commissioner by the Rockefeller Institute of Medical Research to investigate the cause of the disease. He proved the existence of a specific germ, which had been isolated in 1887 by a German investigator named Weichselbaum, and after a long series of experiments he succeeded in producing a serum which has been used with remarkable results. Formerly seventy-five per cent of the victims of this type of meningitis died, while now but twenty-five per cent succumb. Furthermore, those who recover are spared the dreaded after-effects that once made death welcome. Before the discovery of the serum the disease was fatal to nine-tenths of baby victims under two years of age. This high average has been reduced to about fifty per cent, while only 15.9 per cent of the children between five and ten die. W.A.E.

Consult Mohler's *Cerebrospinal Meningitis.*

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MENNONITES, *men'on ites,* a Protestant denomination or sect founded in Zurich, Switzerland, in 1525, the name being derived from that of Menno Simons, who preached in Friesland, in Netherlands. The first Mennonite settlement in the United States was made by immigrants from Holland, who, induced by the offer of religious liberty made by William Penn, settled at Lancaster, Pa., in 1683. Since 1871 large numbers of Mennonite immigrants from Southern Russia have settled in Dakota, Kansas, Minnesota and Canada. The Church membership is represented in about seventeen states of the Union and in Ontario and the western provinces of Canada, the greater number being in Ohio and Pennsylvania. The total number of communicants is about 57,000, with 736 churches and 1,400 ministers. The Church of the Mennonite Brethren of Christ was formed in 1880, being the latest organization of the body of Mennonites, which is now divided among twelve Church branches, which differ somewhat in discipline, doctrine and ritual.

Consult Krehbiel's *Mennonites in North America.*

MENOMINEE, *me nom'i nee,* the name of a tribe of North American Indians. The word means *wild rice men.* They belong to the Algonquian stock and resemble the Ojibways, but have a distinct language of their own. Their home formerly was in Wisconsin and Northern Michigan, and they were found by Nicolet in 1634 at the mouth of the Menominee River. The French established a mission among them in 1670, but during the Revolutionary War and the War of 1812 they aided the English. They now live on a reservation near Green Bay, Wis., and number about 1,600.

MENOMINEE, MICH., one of the most important ports on the Great Lakes for the shipment of lumber. It is the county seat of Menominee County, and is situated in the southernmost corner of the Upper Peninsula, and on Green Bay, at the point where it receives the waters of the Menominee River. The city of Green Bay is fifty miles southwest, and Milwaukee is 165 miles south. Marinette, Wis., is on the opposite bank of the river, here spanned by three bridges. Transportation is provided by the Chicago, Milwaukee & Saint Paul, the Chicago & North Western and the Wisconsin & Michigan railroads, and steamers connect with other lake ports. Menominee is a terminus for the car ferries of the Ann Arbor Railroad.

The location of the city in an extensive lumber region makes the sawing and shipping of lumber the principal industry, and there are manufactories of lumber in all forms. In addition there are factories for making machinery, paper, shoes, beet sugar and stained glass, and packing houses and canneries. Menominee has well-kept parks, fine schools, a public library and museum, the county buildings, Saint Joseph's Hospital and the county agricultural college.

The first settlement was made in 1799 by Louis Chappieu, a French fur trader, and was named for the Menominee Indians, a tribe of the Algonquians. The growth of the place began with the building of the first lumber mill here in 1832; in 1883 the city was incorporated. In 1910 the population was 10,507, and it remained practically stationary thereafter. The area of the city exceeds four square miles.

MENSURATION, *men shoo ra'shun,* treats of the measurement of lines, surfaces and solids. A surface has two dimensions, length and width, and its extent is known as its *area.* Area is expressed in square units. Solids, or bodies with three dimensions, may be measured for volume, which is expressed in cubic units. The measurement of surfaces is made clear by a study of the rectangle, a plane figure having four sides and four right angles. It is the simplest form of plant surface.

The Rectangle. The rectangle represented by Fig. 1 is 12 units long and 4 units wide, and contains 48 square units. There are 12 square units in each row, and there are 4 rows. Looking at it from one *end,* there are 4 square units

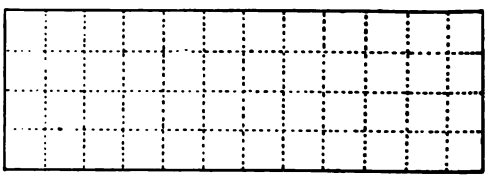

FIG. 1

in one row, and there are 12 rows. If each square represents a square inch, the area of the rectangle is 48 square inches. If each square represents a square foot, the area is 48 square feet.

To find the area of a rectangle (1) ***Express the length and the width in the same unit of linear measure, inch, foot, yard, etc.;*** for example, the length is 8 feet and the width is 12 feet.

(2) ***Multiply the number of units of length by the number of units of width. The product is the number of square units in the rectangle. These square units correspond to the linear units used in expressing the length and width;*** for example,

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(1) Length = 8 ft.
Width = 12 ft.
Area in sq. ft. = 8 × 12 = 96
(2) Length = 14 mi.
Width = 20 mi.
Area in sq. mi. = 14 × 20 = 280
(3) Length = 12½ yd.
Width = 6 yd.
Area in sq. yd. = 6 × 12½ = 75

In school or at home the child learning area should do much real measuring of surfaces; should draw to represent these surfaces, and divide into square units—square inches, square feet and square yards—to realize that the surface of the rectangle is as many square units as the product of the numbers denoting the length and the width (study the article RECTANGLE in connection with this subject).

In general, to find areas of other plane surfaces we compare them with the rectangle.

The Parallelogram. A parallelogram is a plane figure having its opposite sides parallel. The rectangle is a parallelogram, but there are other parallelograms whose angles are not right angles (see Fig. 2).

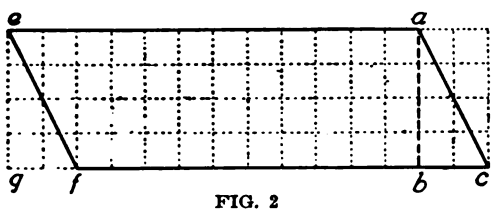

FIG. 2

The base of this parallelogram is 12 units, and its altitude or width is 4 units (note heavy dotted line). See how this may be made into a rectangle by cutting off *a b c*, and fitting it on at *e f g*. Make a drawing, and do this. It is now a rectangle whose length is 12 units and whose width is 4 units, and so has an area of 48 square units.

The area of a parallelogram is the same as the area of a rectangle of the same length and width. (Note the width is the perpendicular distance between the sides.)

Triangle. A figure bounded by three straight lines is a triangle (see Fig. 3, I and II).

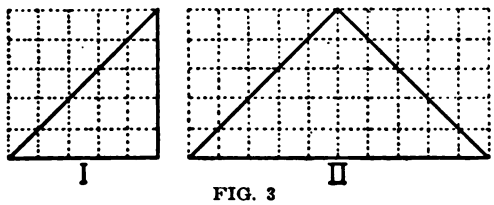

FIG. 3

Examine Fig. 3, I. See that it is half the rectangle in which it is drawn. Now study II, and see how it could be made into a rectangle. The area of I is one-half the area of the rectangle, or $\frac{5 \times 5}{2}$ squares, or 12½ squares. The area of II is equal to the area of a rectangle whose base is 5 and altitude 5, that is, whose base is one-half the base of the triangle, and whose altitude is the same as that of the triangle. In other words, its area is one-half the area of the rectangle in which it is drawn.

Draw several triangles and by cutting and arranging see how each compares with the area of a rectangle of the same base and altitude.

The area of a triangle equals one-half the area of a rectangle of the same dimensions; or, ***The area of a triangle equals one-half the product of its base and altitude.*** This rule may be expressed in the three following mathematical statements:

$$\text{Area of triangle} = \frac{\text{Base} \times \text{Altitude}}{2}$$

$$\text{Area of triangle} = B \times \frac{A}{2}$$

$$\text{Area of triangle} = A \times \frac{B}{2}$$

How many triangular samples of cloth, each having a 6-inch base and 4-inch altitude, can be cut from a piece of cloth 18 inches long and 4 inches wide?

$$\text{Number} = \frac{18}{6} \times 2 = 6$$

Show this by a drawing and cutting. Can you draw and cut in another way? (Study the article TRIANGLE in connection with this subject.)

Trapezoid. A trapezoid has two of its sides parallel (called the bases) and two sides that are not parallel (see Fig. 4, I and II). The

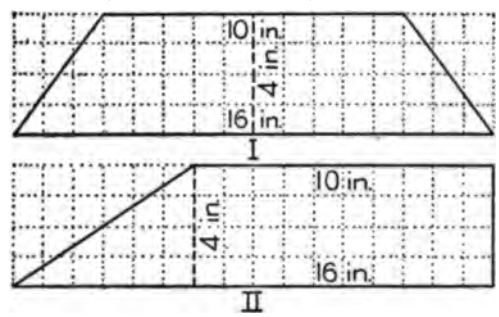

FIG. 4

altitude is the distance between the bases, as shown by the heavy dotted lines in each figure. Examine I and see how it can be made into a rectangle 13 inches long and 4 inches wide. Draw and cut to show this. Look at II and see that it can be made into a rectangle 13 inches long and 4 inches wide.

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The area of a trapezoid is equal to that of a rectangle whose base is one-half the sum of the bases of the trapezoid, and whose altitude is the same as that of the trapezoid. Put in another form: *To find the area of a trapezoid, multiply one-half the sum of the bases by the altitude.*

1. Find the area of a trapezoidal piece of gold leaf, one base 6 inches, the other base 4 inches and the altitude 3 inches.

Base = 6 in.
Base = 4 in.
Average base $= \left(\frac{4+6}{2}\right)$ in. = 5 in.
Altitude = 3 in.
Area in sq. in. $= 3 \times 5 = 15$

Draw this trapezoid. Make of it a rectangle 5 inches by 5 inches.

2. A farmer has a field in the form of a trapezoid. The east boundary line is 40 rods; the west boundary line, which is parallel to the east line, is 60 rods. The distance between these boundaries is 80 rods. How many acres does the field contain?

Base = 60 rd.
Base = 40 rd.
Altitude = 80 rd.
Average base $= \frac{60+40}{2}$ rd. = 50 rd.

Number of acres $= \frac{50 \times \overset{1}{\cancel{80}}}{\underset{2}{\cancel{160}}} = 25$

General Problems in Surface. 1. What is the cost of plastering a room 16 feet by 14 feet, and 9 feet high, at $.50 per square yard?

Number sq. yd. in walls $= \frac{16 \times \overset{1}{\cancel{9}} \times 2}{\underset{1}{\cancel{9}}} + \frac{14 \times \overset{1}{\cancel{9}} \times 2}{\underset{1}{\cancel{9}}} = 60$

Number sq. yd. in ceiling $= \frac{16 \times 14}{9} = \frac{224}{9} = 24\frac{8}{9}$

Cost $= 85 \times \$.50 = \$42.50$

Allowance is made for openings in walls to be plastered in some localities. Sometimes the *entire* surface of the openings is deducted, sometimes *one-half* the surface, and at times *no deduction* is made. It is interesting and good for the students and teacher to know the *local rules* in matters of this kind. Always use the *nearest whole number* of square yards; for example, 12¼ is called 12, while 12¾ is called 13.

2. What will it cost to lay a concrete floor in a milk house 54 feet long and 20 feet wide, at $.95 per square yard?

Number of sq. yd. $= \frac{\overset{6}{\cancel{54}} \times 20}{\underset{1}{\cancel{9}}} = 120$

Cost $= 120 \times \$.95 = \$114.00$

3. A roof is 30 feet long, 18 feet wide. If 9 shingles cover a square foot, and shingles sell at $5 per thousand, what will the shingles for the roof cost?

Number of shingles needed $= 30 \times 18 \times 9 = 4860$
Cost $= 4.860 \times \$5 = \$24.30$
Practical cost $= 5 \times \$5 = \$25.00$

Shingles come in bunches of 250 each, and one must purchase a bunch even though he needs only a fraction of a bunch.

4. A farm along the Illinois River consists of a rectangular piece of land 1 mile long and ½ mile wide, and a triangular piece with a base of ¼ mile, and an altitude of ½ mile. There is an assessment on the farm for drainage of $52 per acre. What is the assessment?

Area of rectangle in acres $= 1 \times \frac{1}{2} \times 640 = 320$
Area of triangle in acres $= \frac{1}{2}$ of $(\frac{1}{4} \times \frac{1}{2}) \times 640 = 40$
Assessment $= 360 \times \$52 = \$18720$

Note that the rectangular field contains ½ a square mile, and as there are 640 acres in 1 square mile, the field contains ½ of that, or 320 acres. The triangle contains ½ the product of its base and altitude, or ½ of ⅛ square mile, or 1/16 square mile, or 40 acres.

Circle. For area of circle, see CIRCLE. In connection with mensuration refer to and study QUADRILATERAL; SQUARE; POLYGON; RHOMBUS; TRIANGLE, and so on. Also see DENOMINATE NUMBERS.

Volumes. Some units for measuring volume are the cubic inch, the cubic foot, the cubic yard. The subject of volume measurements is fully treated in these volumes in the article CUBIC MEASURE. A.H.

Related Subjects. A more detailed knowledge of this subject in its various phases may be gained from the following articles in these volumes:

Angle	Prism
Area	Pyramid
Arithmetic	Quadrilateral
Circle	Rectangle
Cone	Rhombus
Cube	Sphere
Cube Root	Square
Cubic Measure	Square Measure
Cylinder	Trapezium
Geometry	Triangle
Polygon	Weights and Measures

MENTAL HANDICAPS. Physical and mental handicaps, or disorders, are always closely related, for anything which interferes with the health of the body is sure, directly or indirectly, to influence the health of the mind. On the other hand, many, if not most, mental disorders react on the body. A truly sound mind in an unsound body is hardly possible, although it is of course true that occasionally a man or

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woman of great ability does struggle along with a feeble body. Yet even in such instances the individual is not living up to anything like his highest possible efficiency. As a matter of fact, hardly anybody lives up to his highest possible efficiency by probably twenty-five to fifty per cent. And if this is true of the average "well person," what must we say of the one who is definitely and plainly handicapped?

Let us first consider what the common mental disabilities of children are; next, what they mean; and finally, what can be done about them. For our present purposes these may be grouped in the following way:

1. Special mental deficiencies, or shortages occurring in otherwise normal children.
2. Backwardness or dullness, producing slow progress in school but not necessarily interfering with a reasonably successful life.
3. Backwardness of a serious nature, involving more or less mental deficiency of a permanent nature, and interfering with a successful life.
4. Juvenile insanity of a temporary or permanent nature.
5. Unstable mental states (psychic inferiority), producing many kinds of troubles, often of a moral nature.

Special Deficiencies, or Shortages. Probably all of us come under this class to some extent, for no one is perfectly developed in mental equipment. But when a child is definitely and obviously "short" in some particular, he easily becomes a "misfit" in school and is in great danger of becoming a "misfit" in life. If a child does well in most things but very poorly in one or two others, there is some good reason for his shortcoming, and this reason may usually be discovered if we make a careful attempt, along lines now available. Such children are usually "born short" in some definite line, and in so far as we can see at present there is not much that can be done about the matter.

Some children have very little capacity for mathematics, beyond the fundamental operations of adding, subtracting, multiplying and dividing, and the solution of concrete problems. Some have as little capacity for spelling, or for music or rhythmic movements, while others show no aptitude for manual training, drawing, or mechanical work of any kind. Some possess singularly small ability for languages, some have no artistic sense, and so the list might be continued almost indefinitely.

Such children can, of course, make a certain amount of progress along the lines of their deficiencies, but beyond a point of very moderate success they do not pass. Industry and patience and diligence up to a certain degree make a difference, and lead to some improvement, but beyond this very moderate degree of achievement these qualities do not help much, and, indeed, often hinder, for they lead nowhere and expend energy which might be more successfully directed into different channels.

Teachers and parents ought to help a school child to decide when he has reached his probable limit of mental development in certain directions. This is to-day one of the greatest educational problems we have to solve, but the means for its solution are already within our hands, and it is not nearly so hard a matter as at first might seem. Modern vocational guidance must be based upon this principle of the early discovery of capacity for learning.

To progress we must all meet with a fair degree of success in our efforts, for effort without reasonable success dwarfs the soul, mind and body. In the main we succeed best in those things which we like best and which we can do with a fair amount of ease. It appears that one may be just as truly "short" in mathematical as in color sense, yet no one is ever particularly blamed for being quite color blind. The inability to succeed in mathematics may be due to a deficiency in the power of imagery, especially if it involves complex pictures. And some other mental incapacities may be explained, at least in part, by innate differences in the power to form mental pictures.

It is convenient to be born right-handed, but nobody claims that it is really necessary for a successful and happy life. And it is not really any more necessary to have mathematical sense or language sense in a high degree, than it is to have musical sense or artistic sense. Sometime, perhaps, psychologists and educators will learn how to develop these various shortages which trouble many children to-day, but until they do it would seem wiser to apply the same common sense to them that we do to the other things of life which we have learned are not absolutely essential to success.

Of course it is perfectly plain that if a child or an adult is short in several things, he is a mentally deficient person, but if he is only short in one or two particulars, and still averages up well, he is really not mentally deficient at all, and may indeed be a very superior sort of person.

Fortunately, to succeed in life it is not necessary to know all school subjects equally well, but the practical point is that we must select our life work along those lines where our shortages are of little or no importance *to us*. The

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color-blind person cannot expect to be an artist, nor the tone-deaf person a musician; neither can the man or woman who lacks language sense expect to succeed as a linguist. There are plenty of fields of endeavor, however, that are open to all of us who possess average intelligence, and a definite shortage in one or two directions, while it may sometimes be an inconvenience (just as left-handedness is), is, after all, nothing more than that.

The practical lesson from all this is—learn to know yourself as early as possible: learn your special aptitudes and your special inaptitudes, and adjust yourself to life so that you can progress with the least possible amount of friction.

Dr. Luther Gulick makes this very clear when he says in his book, *The Efficient Life:*

> There are conditions for each individual under which he can do the most and the best work. It is his business to ascertain those conditions and to comply with them.

And Dr. David Starr Jordan expresses the same idea in a little different way when he says:

> The best subjects for anyone to study are those best fitted for his own individual development, those which will help make the actual most of him and his life.

The Slow but Not Defective Child. Many children of this class are found in the schools. Sometimes their slowness is caused by physical conditions, such as adenoids; poor nutrition, either from improper food or from certain diseases, such as malaria and hookworm. Other physical causes are insufficient sleep, or sleep in badly-ventilated rooms, excessive coffee drinking, and drinking of wine and beer, sometimes a habit of certain children of foreign parentage. But while some cases of slowness are no doubt produced by physical defects or diseases, or bad habits of living, most cases are *innate,* that is, the child is born this way. This does not mean that such children may not succeed in the world. It only means that they are not educable to a very high degree, in the ordinary meaning of education to-day, and must be content with some of the humbler stations of life.

Schools often make the mistake of attempting to develop children or young people of this class beyond the limit of their natural mental capacities. Trade schools are nearly always well adapted to the type of child whose educational capacity is rather limited, although this does not mean that such schools may not be adapted to other types as well. There should be no sense of disgrace attached to the slow child, for while he may be slow along certain educational lines, he is often very competent in the practical affairs of life.

A dull lawyer, for example, might make a very superior carpenter, or a slow teacher a very excellent mechanic. What we need to do in the schools is to help pupils to find themselves just as early as possible. Tests of mental capacity along different lines have been developed by psychologists which might now be easily applied to children and young people in the way of definite vocational guidance.

Mentally Deficient Children. A good many backward children are now known to be permanently deficient in intelligence to such an extent that they cannot develop beyond a certain definite mental age. For example, a child of fourteen years may be retarded in the fourth grade. Here he seems to remain indefinitely. Now a psychological examination sometimes shows that such a child actually possesses only the intelligence of children of the fourth grade, that is, about nine or ten years. Under these conditions there is very little reason to hope for any greater development of intellect.

The child is permanently arrested in mental growth. All we can do about it is to give such a child the best education his intellect will accept rather than to hope and strive for that which is sure to be a disappointment later in life.

Since 1905, when Binet, a French psychologist, and Simon, a French physician, developed their "intelligence seals" for measuring the intelligence of children in terms of mental age, great progress has been made in the study of children of this type and also of adults who have never passed a child stage of mental development. Investigators in this field now hold that from one to two per cent of the children in our public schools are mentally arrested, or, as we say, feeble-minded. It often happens that outwardly such children give no indication whatever of their mental state. Sometimes they have quite a fine personal appearance.

Without the Binet-Simon and other well-known psychological tests many of these cases could never be understood by either parents or teachers. Because of this mental arrest such individuals pass into adult life with very little *judgment* or will power. It now appears that many criminals (probably about fifty per cent), large numbers of paupers, many juvenile-court cases, and other people who form our most serious social problems belong to the medium

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or high-grade feeble-minded class, or what are now called "morons."

We are learning that one of the best ways to prevent crime, destitution, and many of the results of degeneracy, is to detect the feeble-minded cases while they are still in school, and to place them under the supervision of some one who can safeguard them through life. Some of them need to be placed in public institutions, others can be cared for when understood outside of institutions. Under proper guidance most of this class can learn to be self-supporting. Without such guidance they become wards of society and furnish our most serious social problems. Left to themselves, as they have been in the past, they will continue to swell the ranks of the worthless, simply because their intelligence does not furnish them with the judgment necessary to get along in our complex life of to-day.

Juvenile Insanity. Not much need be said in this place about insanity in children of the school age, as this is strictly a medical rather than an educational problem. Insanity at this age is very uncommon, and about the only form that does occur is what is known as *dementia praecox,* or insanity of the young.

This sometimes makes its appearance in the child of late school age or of high school or college student age. Indications particularly to be observed as pointing in this direction are: dreamy states, a tendency to dream rather than to act; such individuals usually being self-centered, impractical, egotistic. They lack practical application in meeting real problems of life and drift into superficial ways of thinking and acting. They often have high ideals which they are never forceful enough to put into effect. The mental deterioration is usually very gradual but constant. Finally, under some strain, the insanity becomes obvious.

To some extent insanity is *preventable,* and all tendencies to chronic dreamy states, mental inactivity, superficial moralizing without action and failure to meet practical difficulties should be severely discouraged. Nothing is more important than the formation of habits of getting things done promptly and efficiently. The habit of substituting dreamy, self-deceptive ideas and hazy moralizing in place of healthy activity is demoralizing to character formation and a successful life.

Psychic Inferiority. There are some individuals who, while they are neither insane nor feeble-minded, still fail to meet life successfully. They are often nervous, irritable, suggestible, emotional and selfish. They easily "fall into antisocial conduct."

Some of these persons are wanderers or are runaways; some steal, others lie, cheat, or have bad sex habits which they cannot control. These and many other characteristics are found which render the individual antisocial and keep him and his relatives in constant trouble. Many of these inferiors in later life become addicted to the use of alcohol and various drugs. Heredity plays a very important part here, and a bad family history is often discovered on inquiry. Sometimes certain diseases, such as meningitis contracted early in life, seem responsible for the condition.

Many of these cases need control in some institution. Very few if any ever reform and become truly useful members of society. Many of the confirmed criminals are of this type. Such individuals should never be permitted to become parents. See EDUCATION, subtitle *Hygiene of Education;* LIFE EXTENSION. E.B.H.

MEN'TOR, one who gives wise counsel or advice, especially to a younger person; a faithful friend. The way in which this word came to have its present meaning is interesting. According to ancient legend, when Ulysses went from his home to fight in the Trojan War he left his little son, Telemachus, in the care of Mentor, who was really the goddess Minerva in disguise. Mentor proved to be such an excellent guardian that his name, meaning *friendly adviser,* has come to be a word in common use. See ULYSSES.

MEPHISTOPHELES, *mef is tof' e leez,* the devil in Goethe's drama *Faust,* which is based on the medieval legend of a Dr. Faustus who sold his soul to the Evil One in return for twenty-four years of the latter's services. Mephistopheles, a badly-composed word from the Greek, means *not a lover of light.* The old medieval Mephistopheles is a melancholy, sorrowing fellow who would be an angel and tries not to be any worse than he must; but Goethe has invested the character with intellect and a sense of humor. His Mephistopheles really enjoys being Satanic, and has much sport with his victims and their useless struggle to be good. In the opera *Faust* the rôle of Mephistopheles is sung and acted by the leading basso.

MERCATOR, *mer ka' ter,* or *mer kah' tawr,* GERARD (1512-1594), a Flemish geographer. He was born at Rupelmonde, studied at the University of Louvain, and after his graduation continued his studies in mathematics and geography. He wrote and edited various works on his favor-

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ite science, and constructed globes showing the heavens and the earth, but he is remembered chiefly for his invention of the so-called "Mercator's projection" used in map drawing. In maps drawn by this system the meridians and parallels are represented as vertical and horizontal lines, respectively, crossing each other at right angles. This projection does not lead to great distortion in maps of countries near the equator, but when applied to large areas it results in a disproportionate widening of lands or seas distant from the equator. See MAP.

MERCERIZING, *mer'ser ize ing,* a chemical process used in the treatment of cotton fabrics, whereby a lustrous silky effect is obtained. The system was patented in 1850 by John Mercer of Lancashire, England, from whom it derives its name. Mercer discovered that caustic soda or caustic potash changed the nature of cotton fiber, making it shrink and become softer and thicker, and causing it to take the dye more readily, but no practical use was made of the discovery at that time, on account of the excessive shrinkage of material. Later it was found that by treating the cloth under tension the shrinkage was avoided and the familiar, silky appearance was obtained. In the process of mercerizing the cloth the fibers are changed from flattened, spiral tubes to straight translucent ones, and the lustrous effect is due to the reflection of light from the smooth surface of the fabric. Mercerized fabrics assume more brilliant colors in dyeing than materials which have not been so treated, and the best cotton, Egyptian or Sea Island, attains the highest luster.

MERCHANT MARINE, *ma reen'.* The seas are the great highways through which intercourse between the widely-separated nations of the world takes place. The instrument by which this international intercourse or trade is carried on is the merchant marine. This is the name given to the total number of commerce-carrying ships a country possesses. History has shown that those nations, or, in ancient times, those cities, that possessed a large merchant marine not only increased rapidly in wealth but also attained great political power.

British Merchant Marine. It was during the reign of Queen Elizabeth that England, the greatest maritime power to-day, entered earnestly upon the task of building up a merchant marine and of founding a vast colonial empire. Among the most important measures that have helped to establish British sea supremacy were the navigation acts enacted by Oliver Cromwell, especially that of 1661. It is reckoned that at that time the merchant marine of all the European nations amounted to about 2,000,000 tons, of which nearly half belonged to the Dutch, who possessed the largest; about 500,000 tons were English. From that time onward England forged ahead and outdistanced all rivals, gaining the naval supremacy the British now enjoy.

England possessed in 1914 a merchant marine that had a tonnage of over 21,500,000 tons out of a total tonnage of 49,250,000 tons of shipping owned by all the countries in the world, including England. The United States occupied second rank, with a merchant marine of 8,389,000 tons, but this includes the ships engaged in coastwise trade and the vessels that ply on the Great Lakes (see subheading, below). The German submarine campaign, entered upon with great violence in the early part of 1917, in the most desperate phase of the War of the Nations, sank close to 1,000,000 tons of vessels a month, the greater part British.

The Merchant Marine of Germany. The second largest merchant marine engaged in overseas trade in 1914 was that possessed by Germany; it amounted to 5,082,000 tons. This was less than a quarter of the tonnage possessed by England. The German merchant marine grew from a very small beginning to its present size since 1870. It was a splendid example of what an energetic people can accomplish when properly encouraged by its government through subsidies, railway rates and other means. It was by the aid of its merchant marine that Germany built up an extensive foreign trade which nothing of less magnitude than the great War of the Nations could effect. That struggle, due to the blockade of German coast waters, made its merchant marine ineffective.

The Merchant Marine of the United States. The whole merchant marine of the United States which was engaged in oversea trade in 1914 had a tonnage of 1,998,450 tons. This ranked the United States as having the smallest oversea merchant marine of any of the great commercial nations. Before the War of the Nations the foreign commerce of the United States, imports and exports, amounted to about 4,000 million dollars a year; after the outbreak of the war this total greatly increased, but only about ten per cent of its foreign trade was carried in American ships, the remainder being transported in foreign vessels. In 1917, after the United States joined the allies in the great war, plans were at once prepared to increase the

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tonnage by building over a thousand new vessels.

The merchant marine of the United States has not always occupied a low position. Before the proclamation of independence the American colonies had a large merchant marine, and the tonnage of ships owned in New York, Boston and Philadelphia was greater than that owned in London, Liverpool or Glasgow. The prominent part these American merchantmen played in the successful naval battles of the American Revolution is a part of history. It is reckoned that at the beginning of the nineteenth century the American merchant marine was second in the world, amounting to about 970,000 tons, which represented about half the tonnage owned by England. This merchant marine grew steadily, until just before the outbreak of the War of Secession the United States had a merchant marine engaged in foreign trade amounting to 2,300,000 tons, as compared with 3,082,000 tons owned by England. The total merchant marine of the United States, including vessels engaged in the coastwise trade, and those on the Great Lakes, aggregated 5,354,000 tons, while that of England was only 4,252,000 tons. The War of Secession dealt the merchant marine of the United States a blow from which it is still suffering. Another cause of the decline was the substitution of iron for wood in the building of ships, which took place at that time. This gave a great advantage to England. There iron could be manufactured more cheaply than in the United States at that period.

IN 1914
The merchant marine strength of the five greatest carrying nations is shown above, the sizes of the flags representing comparative tonnage. (*a*) England; (*b*) Germany; (*c*) Norway; (*d*) France; (*e*) United States.

The Coastwise Shipping of the United States. Transportation by water between the different parts of a country is called the *coastwise trade.* The laws of the United States provide that only ships built or owned in that country are allowed to engage in coastwise trade. While the American oversea merchant marine has greatly declined, the coastwise shipping has grown to large proportions. The Panama Canal stimulated still more its growth. The shipping engaged in the coastwise trade is over 7,000,000 tons, and of this total ships with a tonnage of nearly 3,000,000 tons ply on the Great Lakes. It is a matter of note that the tonnage of the ships navigating the Great Lakes has nearly doubled since 1900. It is now larger than the merchant marine of any foreign nation except England and Germany.

Shipping Subsidies. In order to build up a national merchant marine many foreign governments grant bounties for the construction of ships, and pay to these ships certain sums of money during the time they are operated. Such help is called *shipping subsidies.* The United States government has never granted such assistance. The only help granted to American shipowners is in the form of so-called postal subventions. In accordance with a law passed in 1891, which is still in force, the Postmaster-General makes contracts with American shipowners for carrying the mails between the United States and foreign ports. For this service the shipowners are paid a certain sum of money, which is in proportion to the size of the steamer and its speed. The contracts are made for a period of five to ten years and are awarded to the lowest bidder.

There has been for many years past an agitation in favor of granting shipping subsidies by the United States government as the best means to create a merchant marine adequate to the needs of the foreign trade of the country. Bills for that purpose have been introduced in Congress several times, but none has become a law. Public opinion has been either lukewarm on the subject or opposed to such a measure. The shortage of shipping tonnage created by the War of the Nations demonstrated the disadvantages resulting to the trade of the country from the lack of an adequate merchant marine. With the merchant marines of Germany, Austria-Hungary and Turkey driven from the seas, with the ships lost by the allies through mines and submarines, and with the remainder of the

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allied ships either used for military purposes or taken away from their usual trade channels, there resulted a great scarcity of ships for carrying on the trade of the world. It was America's opportunity, but facilities were lacking.

Recent Developments. In order to relieve the situation created by the scarcity of ships Congress passed a measure to make it easier for foreign-built ships to register in the American merchant marine. This measure had the effect of transferring in 1915 to the American flag over 523,000 tons of shipping which belonged to other nations. The lack of ships had also the effect of greatly increasing the output of American shipbuilding yards, for during the fiscal years ending June 30, 1915, and June 30, 1916, 1,266 vessels of 215,711 tons and 1,030 vessels of 347,847 tons were built in the United States. O.B.

Consult Hough's *Ocean Traffic and Trade;* Meeker's *History of Shipping Subsidies.*

MERCIER, *mer sya',* HONORÉ (1840-1894), a Canadian barrister and statesman, premier of Quebec from 1887 to 1891, a bold defender of provincial rights and of the Roman Catholic Church. For years he was the idol of the French-Canadians. He was born at Sainte Athanase, was educated at the Jesuit College of Saint Mary at Montreal, and in 1865 was admitted to the bar. While studying law he also edited the *Courrier de Saint Hyacinthe,* one of the leading Liberal papers in Quebec. Unlike most of the Liberals, however, Mercier opposed Confederation on the ground that the French-Canadians would lose their distinctive position and political power.

In 1871 the more aggressive of the French-Canadians organized the Quebec Nationalists for the purpose of asserting what they believed to be their political and religious rights. One of the founders of the party was Mercier. He was a member of the Dominion House of Commons from 1872 to 1874, and in 1879 became solicitor-general of Quebec. In Quebec politics his policy involved an intimate alliance with the Roman Catholic Church, an alliance which became more open after he was elected leader of the Quebec Liberals in 1883. Two years later the execution of Louis Riel brought under Mercier's leadership all the sympathizers who looked on Riel as a martyr. In 1887 Mercier became premier of Quebec, and for the next four years he was the storm center of Canadian politics. At his direction the provincial assembly incorporated the Jesuits and also passed a law compensating them for the estates which had been confiscated by the government years before. These laws aroused a bitter demand in other parts of the Dominion for disallowance, but the House of Commons decided that Mercier's course was within his rights. His services to the Church were recognized in 1891 by Pope Leo XIII, who made him a Count. In the same year charges of misuse of public funds, in connection with the construction of the Baie de Chaleur Railway, were brought against him, and compelled the resignation of his ministry. At the ensuing elections Mercier was reëlected to the assembly, but the party was defeated. Though personally innocent, Mercier's political influence was broken by the scandal.

MERCURY, *mer' ku ri,* or **QUICK'SILVER,** the metal used for filling thermometer and barometer tubes, and the only metal that remains a liquid at ordinary temperatures. Mercury is a silver-white metal, over 13.5 times heavier than water; it flows freely, and when spilled is not easily recovered. Because of these peculiarities the Greeks gave it the name *hydrargyrum,* which means *water silver,* and the Romans named it after the messenger god. Mercury freezes and becomes solid at 37.9° F. below zero and boils at 675° F., changing to a vapor. When heated or cooled it expands or contracts quickly and at a very regular rate; that is, an equal amount for each degree of temperature. For this reason it is especially valuable for thermometers. It combines with a number of metals to form *amalgams* (see AMALGAM).

Its most extensive use is for extracting gold and silver from ores. The powdered ore mixed with water is run over copper plates covered with a thin layer of mercury. The mercury combines with the gold or silver, forming an amalgam, while the rocky or earthy material of the ore is washed away, leaving the gold or silver free (see GOLD; METALLURGY). When the amalgam is heated, the mercury distills off. There are a number of compounds of mercury used in the arts. It unites with oxygen to form a red oxide, used in laboratory experiments. A compound with chlorine (mercurous chloride) is extensively used as a medicine under the name of *calomel.* Another compound with chlorine, *mercuric chloride,* is the well-known and exceedingly poisonous *corrosive sublimate,* often used as an antiseptic and sometimes swallowed by people, with fatal results (see ANTIDOTE). *Mercuric sulphide,* or *cinnabar,* occurs in red crystals and is the chief source of mercury. *Vermilion,* another compound with sulphur, is used in some red paints. Nearly all

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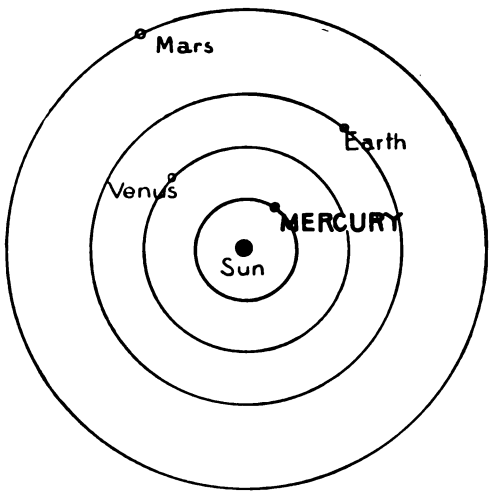
compounds of mercury are very poisonous, and none should be used as a medicine except under the direction of a physician.

Mercury is obtained by roasting the ore, cinnabar, in a current of air. This heating process drives off the sulphur, which combines with oxygen of the air to form a gas, thus leaving the mercury free. Spain, Mexico and the United States produce most of the world's supply. The chief mines in the United States are near the city of San Francisco. J.F.S.

For the best-known uses of mercury, see BAROMETER; THERMOMETER. Consult Lindgren's *Mineral Deposits*.

MERCURY, the smallest of the planets and the nearest to the sun. It was named for Mercury, the swift-footed mythological messenger of the gods. Less is known about Mercury than about any other of the planets, for its nearness



MERCURY'S POSITION
Orbit of Mercury and of the other minor planets.

to the sun makes it difficult to observe. When an evening star, Mercury is seen to advantage in the eastern sky soon after sunset. The Greeks called Mercury Apollo when it was visible in the morning, and Mercury when it was an evening star.

Magnitude of Mercury. The planet has a diameter of about 3,000 miles, somewhat more than one-third of that of the earth; its surface is about one-seventh and its volume about one-eighteenth that of the earth. Its density is not so great as that of the earth, and the gravity on its surface is about one-third of the force of gravity on the earth's surface; a man weighing 150 pounds on earth would weigh about fifty pounds on the planet Mercury. As Mercury has no satellite with which to compare it, measurements given can only be regarded as approximate, and not exact, as in the case of other planets.

Rotation of the Planet. It was for a time understood that Mercury rotated on its axis once in 24 hours, 5 minutes, 28 seconds, but this has been proved incorrect. It revolves in its orbit round the sun in eighty-eight days, and it rotates on its own axis only once during that period, keeping the same face always towards the sun, as the moon does towards the earth. Some astronomers, however, refuse to accept this statement of rotation, adhering to the principle of daily rotation. The average distance of Mercury from the sun is 36,000,000 miles, but its orbit is so eccentric that the distance varies from 28,500,000 miles, nearest distance, to 43,500,000 miles as the greatest distance. The synodic period of the planet, that is, the time taken to travel from conjunction to conjunction, is 116 days.

Transits of Mercury. At intervals of from three to thirteen years the planet Mercury passes across the sun's disk between sun and earth, and becomes visible as a small black spot against the sun. Such transits usually occur in the months of May and November, the latter month having almost twice as many as the former. The last transit visible in the United States was at 8 A.M., November 7, 1914; the next transit will occur in May, 1924. Transits are always carefully observed by astronomers, as they yield valuable information.

Light and Atmosphere. The reflecting power *(albedo)* of Mercury is much below that of the other planets and is inferior to that of the moon. Such atmosphere as Mercury possesses cannot be as dense as that of Venus or the earth. Transits of Venus show by a circle of light surrounding the dark mass against the sun that it has an atmosphere, but in transits of Mercury this light circle is not seen. It is known, however, that water exists in the planet's atmosphere. Revolving in its orbit, Mercury presents to the people of the earth exactly the same phases or positions as the moon,—the crescent, the full moon and the half moon. The surface of the planet receives nearly seven times as much heat and light as is received in the same area on earth, and it has at least two seasons annually. Seen through a telescope the surface of Mercury is not as interesting as the other planets. The disk is brighter at the edge than in the center, but little can be seen of value as a guide to study of the nature and formation of the planet. F.ST.A.

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Related Subjects. For illustration of comparative sizes of the planets, see PLANET. Reference is suggested, also, to the following articles in these volumes:

Astronomy	Moon
Conjunction	Planet

MERCURY, an important deity in classical mythology, who served as the messenger of the gods, and particularly of Jupiter, whose son he was. He presided over eloquence and was the patron of orators and merchants, and also of dishonest persons, thieves and robbers; besides, he ruled over roads and conducted the souls of the dead to Hades. From his birth he was most remarkable, for before noon of the first day of his life he had invented the lyre, and by evening had stolen the cattle of Admetus, which Apollo was tending, and had hidden them. Forced to admit his guilt and to restore the cattle, he confessed that he had eaten ten of them, and in payment he offered Apollo his lyre. The sun god was so pleased with the gift that he gave Mercury in exchange the caduceus (see illustration).

MERCURY
The statue by Bologna, in the National Museum, Florence.

Mercury was a great favorite with the gods, because of his pranks as well as of his wit and intelligence. Jupiter gave him a winged cap and winged sandals and a short, scythelike sword, and by means of these he performed many wonders as the spy and servant of the king of gods. It was he who fixed Ixion to his revolving wheel, who slew the giant Argus, conducted Priam to the tent of Achilles, carried Bacchus to the nymphs, sold Hercules to Omphale and brought Proserpina back from the underworld. His festival was celebrated by Roman merchants on the thirteenth of May, in a temple near the Circus Maximus. The best-known representation of Mercury in art is the bronze statue by Bologna, which shows the god with his winged cap, winged sandals and caduceus; he is poised on one foot, as though about to spring into the air, and one hand is raised, pointing upward. See MYTHOLOGY, and the characters named above.

MERCURY, BICHLORIDE OF. See CORROSIVE SUBLIMATE.

MERCY, SISTERS OF, a name frequently applied to religious societies of women, whose mission is to nurse the sick, to visit the prisoner, to protect women in distress and to educate females. Their work in time of pestilence and plague is well known. The name is specifically applied to the Order of Our Lady of Mercy, a Roman Catholic organization founded in Dublin, in 1827, by Miss Catherine McAuley, who became its first mother superior. The first house of the Order in North America was established in Pittsburgh, Pa., in 1843, and now there are communities of these sisters widely distributed throughout the United States, Europe and Australia. They have no general superior, and are subject to the bishop. The habit is a long, flowing black robe, with long, loose sleeves, and a white hood with white or black veil, the last-named being replaced by a bonnet for street wear. G.W.M.

MER DE GLACE, *glahs,* the name of a celebrated Alpine glacier which has a greater velocity than any other glacier in the Alps Mountains. Its rate of movement is 35.5 inches a day. This sea of ice is situated on the northern slope of Mont Blanc; it has an area of sixteen square miles and a length of about nine miles. It is noted for beautiful surrounding scenery, and is easily reached by tourists from the village of Chamouni. Most sightseers especially wish to view the solitary rock, or oasis, called *Le Jardin,* seven acres in extent and covered with beautiful foliage, which lies in the upper part of the glacier. The lower end is known as the Glacier des Blois, where it flows into the Arveyron River, in the valley of Chamouni. See GLACIER.

MER'EDITH, GEORGE (1828-1909), an English novelist, one of the last eminent figures of the group of fiction writers who made the Victorian Era glorious in English literature. Meredith's first novel, *The Ordeal of Richard Feverel,* by many regarded his greatest achievement, was published in 1859, the year in which George Eliot's *Adam Bede* appeared. It was not until a quarter of a century later, however, when *Diana of the Crossways* was written

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(1885), that his power as a novelist received general recognition. Like his contemporary Browning, he was given to condensing the thought of an entire paragraph into a single sentence or a phrase, and this style of writing, together with his tendency to analyze his characters and to study them from the viewpoint of psychology, kept him from enjoying the popularity that Dickens and Thackeray enjoyed. Thoughtful readers, however, rank him among the foremost novelists of his generation.

Meredith was born in Portsmouth, where his father was engaged in the naval-outfitting business. He was educated in England and in Germany, and for a brief period studied law. When he was twenty-one his first poem, *Chillian-Wallah,* was published, and two years later, in 1851, a volume of *Poems* appeared. Then followed *The Shaving of Shagpat,* an Arabian fantasy (1855), and four years later the masterpiece of his early period, *Richard Feverel.* None of his later efforts surpassed this book in descriptive power, imagination, humor, tenderness and insight into character. The tragic outcome of the story represents Meredith's belief that a novel should have a logical conclusion, that it should portray life as it is.

During thirty years of his long career he acted as literary adviser to a large publishing house, and was the means of encouraging many young writers by his helpful criticism. When Tennyson died, in 1892, his place as president of the British Society of Authors was filled by Meredith, and the latter's seventieth and eightieth birthdays were observed by some of the most eminent writers of the day. Four years before his death, in 1905, he received from King Edward VII the Order of Merit.

Among his most important novels, aside from those mentioned, are *The Egoist, Evan Harrington, Sandra Belloni, Rhoda Fleming, The Adventures of Harry Richmond, Beauchamp's Career* and *The Amazing Marriage.* His poetry, like his novels, requires too much thought of the reader to be widely popular, but much of his verse is of an exceedingly high order. *Modern Love* should be read for its wonderful rhythm and word painting. It is probably the author's best achievement in verse. B.M.W.

MEREDITH, SIR WILLIAM RALPH (1840-), a Canadian statesman and jurist, chief justice of Ontario since 1912. Sir William is one of the most distinguished and most respected of the members of the Canadian bench. The list of offices he has held is helpful, but by no means completely indicates the universal respect in which he is held, not merely for his technical knowledge of the law but for the wide range of his knowledge and his sympathies. Legislation in the interests of workingmen has especially aroused his interest, but all progressive legislation has won his support.

Sir William was born in Middlesex County, Ontario. He went to school at London, Ont., and later attended the University of Toronto. In 1861 he was called to the bar, and until 1894, when he was elevated to the bench, remained in active practice. Political life also attracted him, with the result that he sat in the Ontario assembly from 1872 to 1894. For the larger part of this period, from 1878 to 1894, he was leader of the Conservative opposition. In 1894 he was appointed chief justice of the court of common pleas for Ontario, and in 1912 was appointed chief justice of the supreme court, with the title of chief justice of Ontario. He was given the honor of knighthood in 1896 and in 1900 was elected chancellor of the University of Toronto.

MERGAN'SER, a family of fishing ducks, commonly called *sawbills,* of which there are three groups, the *American merganser, red-breasted merganser* and *hooded merganser.* These birds are distinguished by their long, saw-

RED-BREASTED MERGANSER

toothed bills, the edges of which are notched to enable them to keep hold of their slippery prey. The experienced housewife will never purchase sawbilled duck for the table, because the flesh of these fish-eating birds is rank and unpalatable. The American merganser, known also as *goosander, shelldrake, weaser,* and by various other names, is a North American resident which nests from Minnesota northward, preferring the waterways north of the Canadian border. It is about twenty-three inches long, and has a small crest of feathers on its head. Its

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handsome coat is a combination of glossy greenish-black, salmon-buff, gray and white. In its nest, built of leaves, grasses and moss, and lined with down from the duck's own breast, are laid from six to ten creamy-buff eggs.

The *red-breasted merganser,* as its name indicates, is distinguished by its cinnamon-red breast. This bird nests from Illinois as far north as the Arctic Circle, and in winter is found in Cuba. Its cousin, the *hooded merganser,* wears a handsome black crest on its head, and two crescent-shaped bands of black on the sides of its breast. This bird, which is of more leisurely habits than its two relatives, is fond of still waters and peaceful lakes. It nests throughout its range, from Cuba and Mexico to the far northern part of the continent. The mergansers live about fifty years. See DUCK.

MÉRIDA, *ma're thah,* the capital of the state of Yucatan, Mexico, noted especially for having the largest trade in sisal hemp in the world; the quantity exported annually to America alone is 2,000,000 pounds. A railway connects it with its port, Progreso, on the Gulf of Mexico, about twenty-six miles distant. It was founded in 1542 by Francisco de Montejo, and has numerous institutions and public buildings, many cathedrals and a university. There are manufactories of cigars, cotton goods, panama hats, etc., but the surrounding country is almost exclusively devoted to the hemp industry. Population, 1910, 62,440.

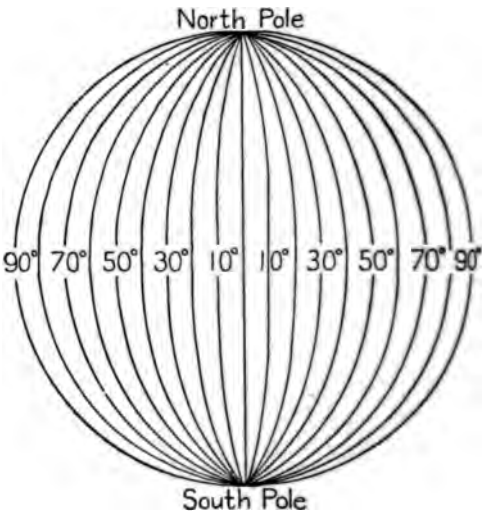
MER'IDEN, CONN., a city in New Haven County, southwest of the center of the state, eighteen miles south and west of Hartford and the same distance northeast of New Haven. It is on the New York, New Haven & Hartford Railroad and on interurban electric lines. The population, which in 1910 was 27,265, was 29,130 in 1916 (Federal estimate). In the same year Meriden town was credited with 34,183.

Meriden covers an area of nearly four square miles, and is situated on uneven ground drained by Harbor Brook, which runs through the town. To the north is Hubbard Park, a reservation of 900 acres; among its picturesque features are three elevations known as the Hanging Hills, which rise to 1,000 feet. Lake Merimere and Castle Craig are other places of interest. Prominent buildings and institutions include the Federal building, the state armory, Curtis Memorial Library, Meriden Hospital, Connecticut School for Boys (reformatory), the Curtis Home for Orphan Children and Aged Women and a tuberculosis sanatorium.

Meriden is called the *Silver City,* because of its extensive manufactures of electroplated and solid silverware. It also has manufactories of hardware, cutlery, glassware, cut glass, brass and bronze goods, firearms, organs, self-playing attachments for pianos and organs, optical instruments, electrical goods and novelties.

Meriden was settled about 1670 and was originally a part of the parish of Wallingford. It became a separate township in 1806 and received a city charter in 1867.

MERIDIAN, *me rid'i an,* in geography, any imaginary line drawn around the earth at right angles to the equator and passing through the north and south poles. There is a meridian for every place on the globe, and when the sun



MERIDIANS SHOWN TEN DEGREES APART

reaches that line it is midday at that place. In order to find the distance of a place east or west of any certain point, men saw that there must be some fixed line from which to measure. In 1884, at a meeting held in Washington, D. C., it was decided to establish a line passing through the observatory at Greenwich, near London, as a starting point, to call it the *prime meridian,* and to reckon distances east or west from it up to 180°, a degree at the equator being equal to about sixty-nine and one-fifth miles. There is also a prime meridian in the Western hemisphere through the city of Washington, but it is little used. The *longitude* of a place is its distance—usually stated in degrees, minutes and seconds—east or west of the meridian selected as a starting point. Distance north or south of the equator is termed *latitude.* See LONGITUDE; LATITUDE.

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MERIDIAN, Miss., an important cotton market, one of the leading manufacturing centers of the state and the county seat of Lauderdale County. It is situated near the eastern state line, about midway between its northern and southern borders, eighty-five miles east of Jackson, the state capital, and 135 miles northwest of Mobile. The Alabama & Vicksburg, the Alabama Great Southern, the Meridian & Memphis, the New Orleans & Northeastern, the Southern and the Mobile & Ohio railroads enter the city. In 1910 the population was 23,285; in 1916 it was 21,818 (Federal estimate) The area of the city is four square miles.

Meridian is located in a fine agricultural district, noted especially for an abundance of cotton, and the leading industrial establishments of the city are largely dependent on this product. They are cotton gins, cotton compresses and cottonseed-oil refineries; besides these there are fertilizer, broom, hosiery and wagon factories, lumber and stave mills and large railroad machine shops. The high school building, the Carnegie Library and the courthouse are worthy of note. The East Mississippi Hospital for the Insane is located here. For higher education the city has Meridian Female College (Methodist Episcopal), opened in 1869; Meridian Male College, Meridian Academy (Methodist Episcopal South), and Lincoln School (Congregational), for colored students.

Meridian was organized in 1854 and was chartered as a city in 1860. In 1906 fire visited the city and destroyed a large portion of the business district. In 1912 the commission form of government was adopted.

MERIMÉE, *ma re ma',* Prosper (1803-1870), a French novelist, historian and dramatist, whose name will live because he wrote *Carmen,* a Spanish gypsy romance, afterward woven into one of the most popular operas by Bizet. He was born in Paris, studied law, but cared little for it, and in 1831 became an inspector of historical monuments in France, his reports being the basis of four volumes which included *Monuments Historiques,* a standard work on archaeology. As a writer of both narrative and dramatic fiction, however, he is best known. His first works, *La Guzla* and *Theatre de Clara Gazul,* were translations of Illyrian songs and Spanish comedies. *Colomba,* published in 1840, was a story of Corsica, and a novel of extraordinary power. *Carmen* was written in 1847. In 1853 he became a senator of France and in 1860 was made commander of the Legion of Honor. He had few equals in his day as a master of style, and in private life was characterized by loyal and devoted friendships. See Carmen.

MERLIN, *mur'lin,* a magician, bard and prophet of British legend, who was supposed to have been the son of a fierce demon and a Welsh princess. When he was yet an infant he began to show his marvelous powers. During the time of the Saxon invasion he invoked two dragons out of the ground, supposed to represent the Saxons and the Britons. As they fought he sang a series of verses in which he predicted the future down to the time of Geoffrey of Monmouth (twelfth century). The story of Merlin was written in Spanish, French, German and English; he is a character in Sir Thomas Malory's *Morte d' Arthur* and in Tennyson's *Idylls of the King.*

A real Merlin is supposed to have lived about 470. He was a Welsh bard, and during the invasion of the Saxons came into the service of King Arthur. After witnessing a horrible battle near Solway he went mad, and forsaking human society lived in caves, singing to himself all day long.

MER'MAID AND MER'MAN, in folklore, mythical creatures who lived in the sea and possessed bodies that were half human and half fish. Mermaids were supposed to wed mortal men, and mortal maids were often enticed by mermen to the sea. The typical mermaid was represented as a beautiful maiden who combed her luxuriant hair with one hand and held a mirror with the other. The figures of both mermaid and merman are frequently found in ancient and medieval art. The origin of the myth is supposed to rest in the humanlike appearance of certain marine animals, such as the seal. Stories of these mythical creatures have been often celebrated in poetry. Tennyson in his *Mermaid* says:

> I would be a mermaid fair;
> I would sing to myself the whole of the day;
> With a comb of pearl I would comb my hair;
> And still as I combed I would sing and say,
> "Who is it loves me? who loves not me?"

MEROVINGIANS, *mer o vin' je anz,* the name given to the first Frankish kings who governed Gaul and laid the foundations of the French nation. The name was from that of *Merovaeus,* an early chieftain of the race. The first powerful king of the dynasty was Clovis, his ambition being to erect a kingdom on the ruins of Roman power. In A. D. 486 he attacked Syagrius, the Roman governor of Gaul, and gained such a decisive victory that Roman

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authority was forever destroyed in that region. Clovis then extended his authority and brought under his power the various Teutonic tribes who inhabited Gaul. His dominions were divided among his four sons on his death in A. D. 511. The Merovingian rulers ultimately became so enfeebled that they were called the "do-nothing" kings, and after a century and a half of government they were pushed aside by an ambitious officer of the Crown, and a new royal line called the *Carolingian* was established. See CLOVIS; CAROLINGIANS.

MERRIMAC, *mer'i mak,* **RIVER,** a river in New Hampshire and Massachusetts, the great water power of which has caused the development of four manufacturing centers, Lowell and Lawrence in Massachusetts, and Manchester and Concord in New Hampshire. The Merrimac, whose name is an Indian word meaning *swift water,* is formed by the union of two streams, the Winnepesaukee and Pemigewasset, which flow together at Franklin, N. H. For sixty miles through New Hampshire the river follows a southward course; then, just south of the Massachusetts boundary, it turns to the east, emptying into the Atlantic Ocean at Newburyport, about 110 miles from Franklin. In this distance it falls 269 feet, and there are steep waterfalls at six points on its course. It drains an area of about 4,550 square miles, and is navigable from Haverhill, Mass., about seventeen miles above its mouth.

MERRY DEL VAL, *mer're del vahl',* RAFAEL (1865-), a Roman Catholic cardinal and secretary of the congregation of the Holy Office. He was born of Spanish parents in London and educated at Ushaw College in Durham, and also in Rome. He took orders in 1888 and became a favorite of Pope Leo XIII, who made him prelate of the Papal household in 1897. He visited England on the occasions of Queen Victoria's jubilee and King Edward's coronation as Papal envoy or representative, and was also sent to Canada on an educational mission. In 1903 he succeeded Cardinal Rampolla as Papal secretary of state, and while holding this office was criticized for adopting a strong policy of aggression. He was created cardinal in November, 1903. Upon the accession of Pope Benedict XV in September, 1914, Cardinal Ferrata succeeded him as secretary of state, and a month later he was appointed as secretary of the congregation of the Holy Office, now chiefly occupied in the suppression of heretical books. His book on *The Truth of the Papal Claims* appeared in 1909.

MERSEY, *mer'si,* a river in the northwestern part of England which is one of the world's most important commercial waterways. It is formed by the junction of the Goyt and the Etherow, and in its length of seventy miles drains an area of 1,600 square miles. Its general direction is southwest, to Runcorn, where it expands into an estuary three miles in width. The great city of Liverpool developed here, and now has a water area of docks and basins of over 400 acres, while the Birkenhead docks, opposite Liverpool, cover 165 acres. Great warehouses are built for storing merchandise, and an immense revenue is derived from tonnage rates on ships. There is some shipbuilding, and the Birkenhead docks are an important center for corn-milling, importation of cattle and export trade to the East. The Manchester Ship Canal, which practically converted that city into a seaport, joins the Mersey at Eastman Locks. Since 1886 a railway tunnel under the river has afforded added communication between the cities of Birkenhead and Liverpool. See LIVERPOOL.

MERTHYR TYDFIL, *mur'thur tid'vil,* a city in the southern part of Wales, on the River Taff, the center of the iron trade of South Wales. It gets its name from Saint Tydfil, who was martyred by the Saxons, *Merthyr* being Welsh for *martyr.* Although it is very old, having been a village on the Roman highway from Cardiff, Merthyr Tydfil was of no especial importance till 1850. Since then its iron and steel industry has made such rapid advance that the town has developed from a country village into a modern commercial city. Besides iron ore, the region produces coal, and Merthyr Tydfil has the largest coal-mining establishments in Wales. Population, 1911, 80,990.

MERV, *merf,* an oasis about 2,000 square miles in area, in the vast plateau desert of Central Asia. Shut in by the Hindu Kush and Herat mountains, on the edge of the desert of Karakoram, Merv has been for centuries the center of industry and population in the plateau region. It is said by the Persians to have been the cradle of the human race. The ruins of an old town, rebuilt by Alexander the Great, the center of Arabic culture in the tenth and eleventh centuries, can still be seen; but the modern town, called New Merv, was founded by the Russians about twenty-five miles west of the old site, after they had captured the oasis from the Turkomans in 1881. Its population is about 12,000; that of the entire oasis, about

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120,000. In the neighboring arid regions the wandering Turkomans breed horses which are famed throughout the world.

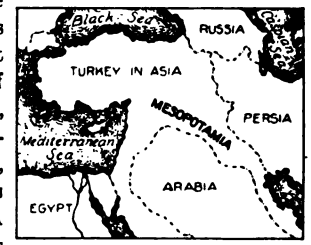
MESA, *ma'sah,* a Spanish name meaning *table,* applied especially in the western part of the United States to tablelands along the Colorado River and its tributaries in Colorado, Utah, New Mexico and Arizona. These were once parts of plateaus which through a long period of time have been partly worn away by streams, the process being known as *erosion.* Two of the best-known mesas are the Mesa Encantado (the Enchanted), in New Mexico, and the Mesa Verde (the Green), in Colorado. The Acoma Indians believe that their ancestors once lived upon the top of the Enchanted Mesa. On the rocky sides of the Mesa Verde are many ruins of old cliff dwellings, relics of the remote past (see CLIFF DWELLERS). Mesas generally have steep sides because of the action of the streams which left them standing. On the broad, level tops, covered with grasses, desert bushes, mesquite and chico, or greasewood, are often found beautiful lakes. Here were once the best ranges for wild cattle, and at the present time these places afford pasturage for cattle and sheep.

MESHHED, or **MESHED,** *mesh'hed,* the capital of the province of Khorassan, situated in the northeastern part of Persia, about 110 miles from the Afghan frontier. It is noted chiefly for its superb mosque, which contains the sacred shrine of Imam Reza, a descendant of the founder of the Shiites, and which is visited each year by 100,000 pilgrims of this sect. The magnificence of this mosque is scarcely equaled in all Persia. The manufactures of Meshhed, which include rugs, shawls, silks, porcelain and sword blades, are conspicuous for their high degree of excellence. Population, about 60,000.

MES'MER, FRIEDRICH ANTON (1733-1815), a German physician, the first exponent of the theory of animal magnetism. He was born near Constance, in Switzerland. In 1772 he decided that a powerful influence could be exerted by one person over another, and this power he called *animal magnetism.* In 1778 he lectured on the subject in Paris, where he created a sensation and made many converts to his views, although he was regarded as an impostor by regular physicians. He was offered an annual pension of about $4,000 to reveal his secret, but he refused to divulge it. On account of suspicions which arose, a commission from the Academy of Sciences was appointed in 1785 to investigate his discoveries. This commission reported unfavorably to his pretentions, and he fell into disrepute. He then visited England and soon went to Switzerland, where he spent the rest of his life in obscurity at Meersburg. See HYPNOTISM.

MESMERISM, *mes'mer iz'm,* the process by which one person produces in another an unconscious condition resembling sleep, now known popularly as *hypnotism.* The theory was first practiced by Friedrich Mesmer, for whom it is named. See HYPNOTISM, and the subjects there referred to.

MESOPOTAMIA, *mes o po ta'mi a,* a name given by the ancient Greeks to the land encircled by the Tigris and Euphrates rivers, covering an area of about 143,000 square miles. The country, according to tradition, was the first settled home of the patriarchs of the Bible. It is now a part of Turkey in Asia, and its inhabitants include Jews, Armenians, Arabs and Kurds. A number of schools are conducted by English, French, German and American missionaries. Mohammedanism is the established religion, but other religions have a semiofficial recognition. Population about 2,000,000.



LOCATION MAP

MESOZOIC, *mes o zo'ik,* **ERA,** the great division of geologic time extending from the Paleozoic to the Cenozoic Era. It is divided into the Triassic System, the Jurassic Period and the Cretaceous System, each of which is described under its title. See, also, GEOLOGY; CENOZOIC ERA; PALEOZOIC ERA.

MESQUITE, *mes keet',* a shrub of arid regions, particularly of the Southwestern United States, Mexico, and parts of Western South America. It is also found in the Hawaiian Islands, transplanted by missionaries. Mesquite requires very little moisture, and will grow in deserts too hot and dry for other plants. Those who know the desert know the mesquite; and romance, sometimes overdrawn, is woven about it in stories of desert life.

When it has plenty of water it grows to be a tree fifty or sixty feet in height, with a trunk three feet in diameter. The wood is valuable for building purposes, and for fence posts and fuel. The seeds are good food for cattle and horses. Two kinds of gum are obtained from

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the mesquite; one is used in the making of candies, the other by Mexicans as a dye.

MESSENIA, *meh se' ni a,* a peninsula in the southwestern part of Greece. It was the most fertile of the Peloponnesus plains which fell into the hands of the early Dorians. After the second Messenian War, Sparta secured possession of Messenia, and until the fourth century B. C. the Messenians were the serfs of the Spartans. In 370 B. C., after Epamonidas, the great statesman of Thebes, marched into Messenia it became an independent state, and a new city, Messene, was founded, its wall going up amid rejoicing in honor of the restored nationality of the people. Two years later a Messenian boy was crowned as victor in the Olympian races; for three hundred years the Messenians had been allowed neither part nor lot in these national games. Messenia's liberation was a blow to the pride of the Spartans as well as to their power and prestige. The independence of the peninsula was maintained until the Romans conquered all Greece in 146 B. C. It is now one of the provinces of modern Greece.

MESSENIA

MESSIAH, *meh si' a,* a Jewish term meaning *the anointed one* and corresponding to the Greek word *Christ.* In early Hebrew history any person anointed with holy oil, such as the high priests or kings, was often called messiah. After God promised David that the throne and scepter would remain in his family forever, the title was applied only to those who represented his royal line. But later, when prophecy foretold the coming of a kingly descendant of David, who would always uphold the kingdom, the name was applied to him alone, and since the birth of Jesus, it has always been His title.

The term *Messianic prophecy* denotes all prophecy which treats of the person, work and kingdom of Christ, while the term *Messianic times* refers not only to the period when Jesus lived on earth, but also to the whole new era which He introduced.

MESSINA, *meh se' na,* a seaport on the extreme northeastern coast of Sicily, on the strait of the same name. It is seventh among the cities of Italy in commercial importance, exporting oranges, lemons, citron, nuts, wines, pumice stone, silk, linen, coral ornaments and fine damask. In ancient times it was known as *Zancle,* the Greek word for *sickle,* and was so called because its harbor is somewhat sickle-shaped. It is supposed to have been founded in 732 B. C. by pirates from Cumae. The Greeks made it a colony about 500 B. C. and changed the name to Messina.

Messina was the cause of the First Punic War (see PUNIC WARS), at the end of which it came into possession of Rome. After the fall of Rome, it belonged to the Saracens, Normans, Hohenstaufens and Spaniards, and since 1861 has been a part of Italy. Besides being much damaged in the many wars and several earthquakes of ancient times, Messina suffered in the French and Spanish War of 1672-1678, and by plague in 1743. In the disastrous earthquake of 1908 it was totally destroyed, but was at once rebuilt, so the traveler now sees a modern city, on an unusually beautiful bay, at the foot of great rugged hills.

Strait of Messina. This is a stretch of water which separates the island of Sicily from Italy. It is about twenty-four miles long, and at the northern end is not more than two miles wide. It is this narrowest part that the old-time sailors dreaded; they thought it impossible to make the passage because of the rocks of Scylla on one side and the whirlpool of Charybdis on the other. Modern seamen, too, say it is very dangerous because of the depth of the water and the strong tidal current. See SCYLLA.

METALLURGY, *met' al ur ji,* the science and art of separating metals from their ores. It is a most ancient art and of the first importance in the history of civilization. The Trojans knew how to obtain pure silver, and they wrought it into ornaments of intricate and beautiful design. The Greeks, too, were cunning workmen, and the Romans attached such importance to the shaping of metals that Vulcan, the smith, was one of their gods. The alchemists of the Middle Ages were fascinated by their researches in the science and discovered curious facts of the utmost importance, which, however, they lacked the knowledge to interpret properly (see ALCHEMY). In modern times metallurgy has become merged with the science of chemistry, of which it was the forerunner.

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Some metals, such as gold, silver and platinum, are found in nuggets or grains in an almost pure state. The surrounding rock is crushed, and the metal is separated by picking or washing in machines (see GOLD; MERCURY). In the case of some other ores, a process known as fusing with a flux is employed. A flux is a substance which will combine with the rocky or metallic envelope of the metal and allow it to be readily melted. The resulting slag is lighter than the molten metal; the latter sinks and can then easily be drawn off at the bottom of the furnace.

Many metals are found combined with sulphur or with oxygen. Among the oxide ores are those of the important metals, iron, manganese and tin. These are freed by heating the ores with carbon (see IRON). Silver, copper, zinc, lead and mercury are commonly made from sulphide ores. The first operation in treating a sulphide ore is usually "roasting." This consists in heating the ore in a current of air. The sulphur combines with the oxygen of the air and is driven off in the form of sulphur dioxide gas. In some instances the metal is left free, as is mercury. In others, the metal, as copper and zinc, is converted into an oxide which is then reduced by smelting with carbon.

Amalgamation. This process is frequently employed in extracting gold and silver. When brought into contact with mercury, the crushed ore readily unites with it, forming an *amalgam*. The mercury is then removed by distillation, leaving the gold or silver in a free state (see MERCURY; GOLD; SILVER).

Another so-called wet process consists in dissolving the gold or silver from the ore by chemical action and then precipitating it (dropping it to the bottom of its receptacle), either by using another chemical or by applying electricity. In one process for the extraction of gold, the solvent used is potassium cyanide; in another it is chlorine. Both of these reagents are extremely poisonous.

Electrolysis. In this process the ore is deposited in a solution of the metal which it is desired to free. The ore is attached to the positive electrode and a plate of similar metal to the negative electrode. When the current is turned on the metal is dissolved from the ore and deposited on the metal plate. This process will be found described in the articles ELECTROTYPING and ELECTROLYSIS. It is advantageous in freeing copper. J.F.S.

Consult Hoffman's *General Metallurgy;* Roberts-Austen's *Introduction to Study of Metallurgy.*

METALS, *met'alz,* one of the two great classes of elements (see CHEMISTRY, subhead *Elements*), or any material resembling these. Metals are usually lustrous, malleable, ductile, strong and good conductors of heat and electricity. The six metals known to the ancients were gold, silver, copper, tin, iron and lead. The alchemists of the Middle Ages recognized mercury as a liquid metal and associated each of the seven metals with one of the heavenly bodies, as follows: gold, the sun (Sol); silver, the moon (Luna); copper, Venus; iron, Mars; tin, Jupiter; lead, Saturn; mercury, Mercury. Modern chemists have discovered many additional metals. Some of these, such as lithium, sodium, potassium, calcium, magnesium and aluminum, are much lighter than those previously known. Others, such as platinum and iridium, are heavier than even gold. Alloys of the metallic elements are also commonly called metals. Among such are brass, bronze, magnatium, bell metal, gun metal, Britannia metal, type metal, etc.

Related Subjects. The following articles in these volumes, most of them dealing with specific metals but a few with more general topics, will be found helpful:

Alloy	Magnesium
Aluminum	Manganese
Antimony	Mercury
Arsenic	Metallurgy
Babbitt Metal	Minerals and Mineralogy
Barium	Nickel
Bismuth	Osmium
Brass	Palladium
Bronze	Platinum
Calcium	Potassium
Chemistry	Radium
Chromium	Silver
Cobalt	Sodium
Copper	Steel
Copper Glance	Strontium
Galena	Thorium
Gallium	Tin
Galvanized Iron	Titanium
German Silver	Tungsten
Gold	Uranium
Iridium	Vanadium
Iron	Zinc
Lead	
Lithium	

METAMORPHIC, *met a mawr' fik,* **ROCKS.** See METAMORPHISM, below.

METAMORPHISM, *met a mawr' fiz'm,* from Greek words meaning *change in form,* is the name given by geologists to changes which rocks have undergone since their formation. The agencies causing these changes are heat, pressure, chemical action and moisture, but heat and pressure are the most important. The changes include:

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(1) Hardening of the rock, as in the case of sandstone;

(2) Change in composition and structure, as in slate. Slate was at first mud, then it became shale, and, finally, under the influence of heat and pressure, it was changed into its present form;

(3) Crystallization. The formation of marble from limestone is a good illustration of this change. Under intense heat the limestone was partially melted, and on cooling the particles arranged themselves in crystals, which are readily seen by examining a piece of marble with a magnifying glass.

Rocks have been subjected to heat in two ways; first, by lava, which has been forced up through crevices or thrown out by volcanoes, and, second, by movement of the earth's crust, which is always accompanied by both heat and pressure. See GEOLOGY.

Metamorphic Rocks. Rocks changed by heat and pressure, as described above, are known as *metamorphic rocks*. They differ from igneous rocks in that the latter were formed in the state in which they now exist, while metamorphic rocks have had their characteristics changed by heat and pressure. See IGNEOUS ROCKS.

METAMORPHOSIS, *met a maur' fo sis.* In studying the life history of certain animals, such as frogs, a great variety of insects, sea urchins and crabs, we find that the little creature which emerges from the egg is wholly unlike the full-grown animal, and that during the process of development striking changes in structure and appearance occur before maturity is reached. This unfolding process is known as *metamorphosis,* a name derived from a Greek word meaning *to transform.* It is nowhere more strikingly illustrated than in the life cycle of the butterfly, whose development is also an example of *complete metamorphosis.* That is, including its existence in the egg, it passes through four stages of growth. The newly-hatched creature is known as a *larva,* and the first stage of development after its emergence from the egg is the *larval period.*

The Larval Butterfly. The larva of the butterfly is a crawling, fuzzy caterpillar, brown, yellow or white in color, or a huge green worm with broad rings of black, bearing no resemblance to the beautiful, winged adult. It has several pairs of legs, biting jaws instead of a long, slender, sucking tube, and no wings. It eats greedily, grows rapidly and molts its skin several times, after which it enters upon the third, or pupal, period.

The Pupa. The third stage in the life history of the butterfly is a very quiet one, for the larva shuts itself up in a smooth, hard case known as a *chrysalis,* which is suspended from a twig or the underside of a leaf. During this period of inactivity the wings, legs and body of the mature insect are being formed, and other mysterious changes are taking place which science does not fully understand.

The Imago. When the end of the third period arrives the case splits open, and the *imago,* or fully-developed insect, is released from its prison.

Other Examples. Another interesting example of metamorphosis is that of the toad, which comes out of the egg a small, wriggling tadpole. This tiny creature lives under water and breathes by means of gills, but as it grows larger it develops lungs and pairs of fore- and hind legs, and gradually loses its tail. Finally it is ready to leave its home in the water and live for the most part on the land, a full-grown toad. The grasshopper is an insect which passes through but three stages of development, omitting the chrysalid period entirely. Its metamorphosis is therefore *incomplete.*

For special details, see FROG; TOAD; INSECT; BUTTERFLY; MOTH, and other articles describing animals subject to metamorphosis. Consult Lubbock's *The Metamorphosis of Insects.*

METAPHOR, *met' a for,* one of the commonest of the figures of speech, which indicates a resemblance between two objects by applying to one a name or an action which belongs to the other. In the simile the resemblance is pointed out by means of some such word as *like,* or *as;* in the metaphor it is merely implied; but the two figures resemble each other closely, and to change one into the other is easy. Literature abounds in metaphor, and the least poetic man uses it almost daily in his speech. Such expressions as "angry waves," "soft speech," "singing brook," are all metaphorical in their origin, though they have become so common that their figurative force is no longer felt. In such quotations as the following, however, the mind feels the force of the unaccustomed turns of thought, and is impressed by them:

Lowliness is young Ambition's ladder,
Whereto the climber-upward turns his face.
—SHAKESPEARE: *Julius Caesar.*

He were no lion, were not Romans hinds.
—SHAKESPEARE: *Julius Caesar.*

I am the vine, ye are the branches.
—*Bible.*

The Lord is my rock and my fortress.
—*Bible.*

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Mixed Metaphor. In the use of this very common and striking form of speech, there is a danger that an abrupt change of figure, or the use of two or more metaphors in too rapid succession, may give rise to the absurdity known as a mixed metaphor. The so-called "Irish bulls" are examples of this misuse of figurative language. Examples may often be found in newspapers, and recognized authorities in literature are sometimes betrayed into them. The following quotations from various sources are mixed metaphors:

The chariot of the revolution is rolling along and gnashing its teeth as it rolls.

The backbone of the cold wave is broken.

He received severe injuries at the hands of a bulldog.

METAPHYSICS, *met a fiz' iks,* a branch of philosophy concerning itself with such ultimate problems as the nature of substance, of cause, of time and space. It is the branch which, according to its spokesmen, should crown the whole structure of the physical sciences and become the final master-science.

The Greek philosophy gave to metaphysics a lofty reach. It was natural to the Greek mind to distrust simple appearance, and to look beyond the visible, tangible world of objects for another sort of reality, which such thinkers as Plato regarded as the deepest and most worthy reality. This idealistic view of the universe dominated philosophy for centuries, but it has undergone noticeable modification in the modern world, some critics going so far as to deny the utility of metaphysics.

The special sciences, physics, zoölogy, chemistry, etc., deal confidently with appearances—a world of things that can be touched and seen and which do not challenge the reality of these appearances. Metaphysics, on the contrary, in its quest of ultimate reality challenges and examines the assumption on which the special sciences rest.

The name metaphysics is derived from Greek words meaning *following the physics,* referring to the position this science had in the collected works of Aristotle.

Consult Calkins' *Persistent Problems in Philosophy;* Fullerton's *A System of Metaphysics.*

METCALFE, Charles Theophilus, Baron (1785-1846), a British statesman and colonial administrator, Governor-General of Canada from 1843 to 1845. Though personally a man of great popularity and many admirable qualities, Metcalfe received his training in a political school whose methods were those of the eighteenth century. It was unfortunate for his fame that he should have been sent to Canada at the very time when the struggle for responsible government was at its height. In India and Jamaica he had played the part of a benevolent autocrat, but when he tried the same rôle on Canada he was destined to failure, and his reputation has suffered because he opposed responsible government.

Metcalfe was born at Calcutta, India, but received his education in England. After his graduation from Eton in 1800 he returned to India to enter the service of the East India Company. Having been allowed to taste the delights of English society, young Metcalfe was reluctant to leave, but finally submitted when his father, a director of the company, insisted. He remained in India until 1838, more than half of his life being spent in the service of the East India Company. He became a member of the supreme council of India in 1827, and was temporary Governor-General in 1835. During this one year he initiated a number of reforms, the most important of which was to insure freedom of the press. "If India," he said, "could be preserved as a part of the British Empire only by keeping its inhabitants in a state of ignorance, our domination would be a curse to the country and ought to cease." Such ideas were not approved by the company's directors, and Metcalfe resigned in 1838.

In the next year the British government appointed him governor of Jamaica, where he showed great tact and executive ability, particularly in establishing more friendly relations between the negroes and the planters. In 1842 he returned to England, but in the next year was appointed Governor-General of Canada. There he found a government by party, which he had never before faced. Almost immediately he came into conflict with the assembly, and refused to admit the executive council's right to be consulted on appointments. The general elections of 1844 resulted in a defeat for the Reformers, and allowed Metcalfe to pick a council or cabinet which agreed with him. It was a misfortune for him as well as for Canada that he lacked the training and the temper to apply the new principle of government to Canada. In 1845 Metcalfe resigned and returned to England. W.F.Z.

METCHNIKOFF, *mech' ni kohf,* Elie (1845-1916), one of the world's greatest biologists, for many years a professor at Pasteur Institute, Paris. His theory that the congestion of blood

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at a wound is the result of a struggle between the white blood corpuscles and the disease germs came to be commonly accepted before his death, but at the time he announced this law it was looked upon as revolutionary. This was one of Metchnikoff's great contributions to bacteriology; another was his insistence upon the knowledge of human physiology and pathology which might be gained from a study of animals. His life was bound up in his studies; the $20,000 which he received in 1908 as his share of the Nobel Prize he devoted to his researches; and his death came as the result of self-inoculation during an experiment.

Metchnikoff was born in the province of Kharkov, in Russia—a "son of the steppes," as he was proud of calling himself. He completed his four-years' university course in two years, studied at various German schools, and from 1870 to 1882 taught zoölogy in Odessa University. In 1892, after he had announced his discovery about the work of the white corpuscles, he received his appointment at Pasteur Institute, of which in 1895 he became subdirector.

Many of Metchnikoff's later researches were directed toward the combating of old age, and he regarded it as significant that he who came of a decidedly short-lived family lived to be over seventy. His theory, which has not as yet been fully tested, was that old age is brought on by accumulations of putrefactive bacteria in the intestines, and that to check these, preparations of sour milk should be included in the diet. One of his works, *The Prolongation of Life,* deals with this phase of his study. Other writings are *The Nature of Man, Lectures on the Comparative Pathology of Inflammation* and *Immunity in Infective Diseases.*

METEOROLOGY, *me te or ol' o ji,* a science of somewhat recent development, through which predictions are made as to weather conditions and approaching storms. The term is derived from two Greek words meaning *things in the air* and *discourse.* Meteorology is the study of atmospheric conditions, particularly in their relation to climate and weather, and it is a branch of natural science that directly concerns a large proportion of mankind. Practically every civilized nation maintains an official bureau for the study and forecasting of weather conditions, the most important of which are conducted by the governments of Great Britain, the United States, Canada, France, Germany, Austria-Hungary, Russia, Italy and Argentina.

Several times a day these bureaus receive reports by telegraph and cable from observation stations all over the world, and from these records they compile weather maps and make their forecasts. Bulletins and signals are displayed at specified places regularly, warning the public of changes in the weather, high winds, coming storms, floods and other conditions. One may read each day in the local newspaper the probable weather conditions for the day following, and these predictions are correct in a surprisingly large number of cases. The practical value of the science of meteorology to farmers, fruit growers, owners of merchant vessels and others whose business is directly influenced by weather conditions is beyond estimate, and warnings of approaching severe storms have in numerous cases been the means of saving human life.

In making observations for compiling weather maps and bulletins the conditions given the greatest weight are temperature, atmospheric pressure and humidity (amount of water vapor in the air). Cloudiness, evaporation, amount of rainfall, direction and velocity of wind and atmospheric electricity are other important elements. The principal instruments used are *thermometers,* for determining degrees of heat and cold; *barometers,* for measuring the pressure of the atmosphere; *hygrometers,* for ascertaining the amount of moisture in the air; *anemometers,* for recording the force and velocity of the wind; and *rain gauges,* for determining the amount of rainfall. Each of the instruments is described in these volumes. Upon temperature and barometric pressure depend the winds which bring fair or foul weather. Areas of high and low pressure are indicated on the weather maps, together with the direction of winds and the places where snow or rain is falling. Places of equal temperature are connected by *isothermal lines,* and those of equal pressure by lines called *isobars.* Symbols used for conveying information are explained by notes on the maps, which are so clear and simple that no one should have trouble in understanding them.

The weather bureau service of the United States, established in connection with the War Department in 1870, has been a part of the Department of Agriculture since 1891. That of the Dominion of Canada is conducted as a division of the Department of Marine and Fisheries.

Consult Moore's *Descriptive Meteorology;* Milham's *Meteorology.*

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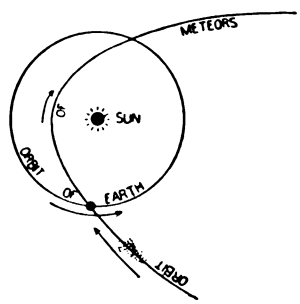
Related Subjects. The reader is referred to the following articles in these volumes:

Air	Land and Sea Breezes
Blizzard	Lightning
Chinook	Monsoon
Climate	Norther
Cloud	Prevailing Westerlies
Cyclone	Rain
Dew	Simoom
Doldrums	Sirocco
Flood	Snow
Fog	Storms
Frost	Trade Winds
Hail	Typhoon
Humidity	Weather Bureau
Hurricane	Whirlwind
Isobars	Wind
Isothermal Lines	

METEORS, *me'te orz,* sometimes called SHOOTING STARS, are bodies which from above enter the atmosphere surrounding the earth and in their descent become heated by the friction of the air. In many cases the heat generated is so great that the meteors are consumed before reaching the earth. Before these meteors approach the earth's atmosphere they are invisible, traveling in an orbit round the sun. As soon as they touch the atmosphere their temperature is raised about 600,000 degrees. This causes an immense evolution of light, and meteors of the smallest proportions —appearing as merely pin points—become visible in the form of light, which may last barely a second, or sweep across the sky in a great arc, leaving a luminous trail lasting for several minutes.

Some meteors vanish in dust and ashes at a height of forty or fifty miles above the earth, others reach to within five or ten miles, while sometimes meteorites actually fall to the surface of the earth; they sometimes burst into several fragments with a noise that may be heard for some distance. At certain periods the earth encounters shoals of meteors, the sky apparently being filled with a shower of flying fires. The most brilliant meteoric shower recorded occurred on November 13, 1833, and it is now established that November is the month of meteoric displays. Every November, about the 13th, numbers of meteors become visible, and it is authoritatively stated that meteoric showers are periodic, becoming extremely brilliant every thirty-third year. This is said to be due to the fact that a great ring of irregularly distributed particles revolves around the sun continually and the earth passes through the densest portion every third of a century.



Orbit of the earth and of a meteor stream.

Among the meteorites known to have fallen on the earth that are regarded as the most interesting and important is a huge meteorite weighing thirty-six and one-half tons brought from his first trip from Western Greenland by Peary, later the discoverer of the North Pole. In the British Museum, London, is a meteorite weighing three and one-half tons, and at Bacubirito in Mexico is a mass six feet wide and five feet thick which weighs fifty tons. At Knyahinya in Hungary a meteor weighing 547 pounds fell in 1886 and made a hole in the earth eleven feet deep, while small meteors fell on ice a few inches thick and rebounded. F.ST.A.

ME'TER, the rhythmical arrangement of words in poetry. A line, to be metrical, must be divided into a certain number of sections called feet which have the accent similarly placed. In the ancient languages the meter depended on the length of the *vowels*—short vowels must follow long, or *vice versa,* according to a regular rule. In English, as in most other modern languages, the vowel length has nothing to do with the matter, which depends entirely on the number of syllables and the placing of the accent. Of the meters in use in English the commonest are the *iambic,* in which each foot consists of two syllables, an unaccented followed by an accented, as:

As I'/dle as'/a paint'/ed ship';

the *trochaic,* in which an accented syllable is followed by an unaccented:

Scots', wha/hae' with/Wal'-lace/bled';

the *dactylic,* which consists of an accented syllable followed by two unaccented:

Hail' to the/Chief' who in/tri'-umph ad/van'ces;

the *anapestic,* in which each foot has two short and one long syllable:

And the night'/shall be filled'/with mus'/ic;

and the *amphibrachic,* in which one accented syllable occurs between two unaccented:

O hush' thee/my ba'-bie/thy sire' was/a knight'.

There are very often irregularities in these metrical forms, but every line of verse will be found to conform more or less closely to one

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of them. Verse in which each line contains but two feet is known as *dimeter;* that of three feet as *trimeter;* four feet, *tetrameter;* five, *pentameter;* six, *hexameter,* and seven, *heptameter.*

METER, the unit of linear, or long, measure, in the metric system of weights and measures. It is equal to 39.37+ inches, and is therefore 3⅜ inches longer than the English and American yard. The present standard meter of the International Metric Commission is a bar of platino-iridium, forty inches long and eight-tenths of an inch square, grooved out on all four sides, thus providing the greatest rigidity. It is divided into decimeters, centimeters and millimeters. It is kept under a sliding, microscopic glass cover in the International Metric Bureau of Paris.

The length of the meter is one ten-millionth of the distance from the equator to the poles. It was adopted as the standard unit of length by France in 1799, and in 1837 its use was made obligatory. It has since been adopted

INTERNATIONAL METER

with the other units of the metric system in Germany, Austria-Hungary, Belgium, Spain, Italy, Greece, the Netherlands, Portugal, Norway, Sweden, Switzerland, Serbia, Rumania, Siam, Brazil, Chile, the Argentine Republic and Uruguay. Its use is legalized in the United States, Canada, Great Britain, Egypt, Japan, China, Turkey, Russia, Bolivia, Venezuela and Paraguay. See METRIC SYSTEM.

METHODISTS, *meth'ud ists.* When John Wesley, one of the world's great reformers, formed a little society for religious betterment, he did not think that he was founding a new sect. Indeed, he hated sectarianism, and to show this feeling called his followers simply the United Society; but lookers-on, seeing the ordered life and the moral strictness of the earnest leader and his followers, bestowed upon them the title of *Methodists.* This name, given half in derision, is now borne by all those who belong to the Churches which look upon Wesley as their founder. It would be untrue to say that it is borne by all who are, spiritually speaking, followers of Wesley, for there is not a Protestant Church which has not felt his influence and been largely modified by it.

Early Growth. The message which Wesley had for the people was so stimulating that it found everywhere a ready hearing, and the United Society grew beyond the bounds of a single association. Branch societies were formed in various communities, and these were subdivided into classes, over each of which a leader was placed. Wesley himself rode about preaching to them, but made no attempt to organize them into a single body or to separate them from the Church of England. In time, when the movement spread more widely, other clergymen, still of the Church of England, but accepting the new doctrines, took part of Wesley's work, and lay preachers also were appointed. Finally, as the Church of England refused to accept some of the results of Wesley's work, or to recognize his clergymen, the society became a separate denomination. Missionaries were sent out to America in 1784, and it was at a conference held in Baltimore late in that year that a formal Church organization was begun, and the title of *Methodist Episcopal* adopted.

Branches. The Methodist Church has been unable to avoid dissensions which have resulted in a division into various branches. In England the main body is that known as the Wesleyan Methodist Church, while in the United

LOVELY LANE MEETING HOUSE
Building in Baltimore in which the Methodist Episcopal Church was organized, in 1784.

States the Methodist Episcopal Church is the strongest. This body split on the slavery matter, however, and though this original question has long been settled, there still remains the Methodist Episcopal Church South, a numerous sect. There is also the African Methodist Church, organized especially for the colored people; the Free Methodist Church, which insists upon a return to the strict practices and simple living of former days; and the Methodist Protestant Church, which has as its basic principles the right of laymen to a part in Church councils.

In recent years a determined effort has been made to unite the Church North and South, and all indications are that in the near future, not later than 1924, the breach which has re-

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tarded the work of Methodism in the United States will be closed. The General Conference of the Northern branch, in 1916, took definite steps in this direction. That such union can be accomplished successfully is proved in the case of Canada. In 1883 all the branches of Methodism there united, and since that date a movement has been on foot to join in this union the Presbyterian and Congregational churches, as well.

Doctrines and Government. The doctrines of the Church, based on the specific teachings of Wesley, have changed little, nor have they ever been the subject of much controversy. A belief in the divinity of Christ is fundamental, and other doctrines assert that all men are sinners, who may through belief in Christ receive forgiveness and adoption into the family of God; that God, while hating all sin, loves all men; that Christ died to make possible salvation from sin; that the Holy Spirit is given to convict men of sin; and that "sanctification," or living constantly in a spirit of love toward God and men, is possible to those who earnestly desire it.

In its form of government the Church is Episcopal, that is, it is organized as a hierarchy, with bishops at its head. The governing body, in most countries, is a General Conference which meets but once in four years, and is composed not only of bishops and other officials, but admits clerical and lay delegates, as well.

Influence. With a membership in 1915 of over 7,300,000 in the United States, 1,800,000 in the United Kingdom, 351,000 in Canada, and considerable numbers in Asia, South America and on the continent of Europe, the Methodist Church stands as one of the strongest of all Protestant denominations. It is also, and always has been, one of the most aggressive. It did much to bring about the abolition of slavery and much to forward the cause of general education, and to-day wherever Methodism has gone there are schools and colleges. Its missions are in all parts of the world, and its numerous publishing houses spread Christian literature broadcast.

Consult Tigert's *The Making of Methodism;* Green's *Mission of Methodism.*

METHUEN, *me thu' en,* MASS., a city of Essex County, thirty miles north and west of Boston, close to the New Hampshire state boundary line. It is on the Spicket River, a short northern tributary of the Merrimac, and on the Boston & Maine Railroad. The population, which in 1910 was 11,448, was reported by the state census of 1915 as 14,007, and by a Federal estimate in 1916 as 13,921.

Methuen has an area of twenty square miles. It is an attractive residential town for workers in adjoining towns. Among its art treasures are a large statue of Washington, sculptured by Ball, and one of the best-known memorial windows by John La Farge. The city has Nevin's Memorial Library, a fine high school building and the Nevin's Home for Aged and Incurables. There are manufactories of cotton and woolen goods, yarn and hosiery.

Methuen was first settled about 1641 and was a part of Haverhill until 1725, when it was incorporated as a separate town. W.L.S.G.

METHYLATED, *meth' i la ted,* **SPIRIT.** See WOOD SPIRIT.

METONYMY, *me ton' i mi,* derived from a Greek word meaning *change of name,* is a term applied to a figure of speech based upon significant relation of some kind. That is, a thing is called or described by some other than its own name, because the thing spoken of and the thing referred to have some important relationship. There are several kinds of metonymy, but the following are the most commonly used:

"The kettle boils." It is not the kettle that boils, but the water which the kettle contains. This is the use of the *container for the thing contained.*

"He deserves the palm." He deserves not the palm, but that for which it is a sign, the victory. This is termed the use of the *sign for the thing signified.*

"Have you read Shakespeare?" means "Have you read his works?" This is an example of *cause used for effect.*

"Gray hairs should be respected." Gray hairs should not be respected, but old age, that of which they are the result. This is the use of *effect for cause.*

Synecdoche (which see), in which the part is put for the whole or the whole for the part, is a form of metonymy.

METRIC, *met' rik,* **SYSTEM,** a system of weights and measures which derives its name from its principal unit, which is the *meter.* The metric system was developed by a commission of French scientific men and was adopted as a legal system of weights and measures in France in 1799. During the nineteenth century one after another of the countries of the world adopted it on account of its simplicity and of the many advantages it possesses over the old local weights and measures. To-day nearly every country in Europe and

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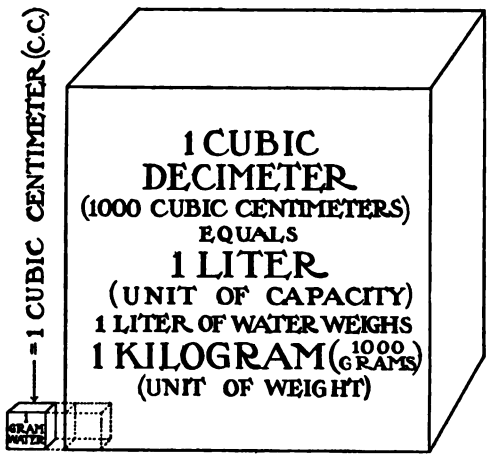
most of the republics of South America use the metric system, and it has also been legally recognized in Japan and China. England and its possessions and the United States are the only civilized countries that have not adopted it for common use, although these legally recognize it. For scientific work and measurements the metric system is used all over the world.

In 1866 Congress passed the law making the use of the metric system legal in the United States for those who wish to use it, and since that time it has been adopted for many purposes. It is used in all the base measurements and the computations of the Coast and Geodetic Survey, in weights at the mint for coining money, in weighing all foreign mail matter, and in all the government departments dealing with the operations of the tariff laws, as well



UNITS FOR COMPARISON

as in the United States Bureau of Standards at Washington. Since 1894 the legal units of electrical measures in the United States are based on the metric system. The metric system is the legal system of weights and measures in Cuba, Porto Rico and the Philippines.

A knowledge of the metric system is therefore very useful and in some cases absolutely necessary. Anyone who intends to engage in business, and especially in foreign trade, or who wishes to enter the civil service, or intends to become an engineer, or who is planning to study any branch of pure or applied science, must have a good knowledge of the metric system—a system quite easily learned on account of its simplicity.

How It Is Organized. The metric system presents many advantages. The principal unit of the system is the *meter,* which is the unit of length, in the same sense that the *yard* is our common unit of length. All the other units of surface, volume, capacity and weight are directly derived from it. Furthermore, the interrelation between them is a very simple one, as a definite volume of water is taken as the unit of capacity and mass. Thus one *liter* contains one *cubic decimeter* of water and weighs one *kilogram.* Then the whole system has a uniform scale of relation between its units, which is a decimal one, that is, the scale selected for the multiples and subdivisions of the various units is ten. This is shown in the following table:

ten millimeters	=one centimeter
ten centimeters	=one decimeter
ten decimeters	=one METER
ten METERS	=one dekameter
ten dekameters	=one hektometer
ten hektometers	=one kilometer
ten kilometers	=one myriameter

The same is true for the other units, the *liter* and the *gram.* Thus *ten liters* are equal to one *dekaliter,* or ten *decigrams* are equal to one *gram.*

Another advantage of the metric system is its uniform system of names, which are formed by adding to the chief units the same prefixes, as given in the table below. Each unit is divided into tenths, hundredths, thousandths and so on, for subdivisions, and multiplied by ten, hundred, thousand, and so on, for units of higher denominations.

The names of the higher denominations are formed by the use of Greek prefixes and the names of the subdivisions by the use of Latin prefixes:

Greek	myria	means 10,000
	kilo	means 1,000
	hekto	means 100
	deka	means 10

The units are the *meter, liter, gram.*

Latin	deci	means one tenth (.1)
	centi	means one hundredth (.01)
	milli	means one thousandth (.001)

Metric numbers are written decimally, with the decimal point placed immediately after the unit. For example, 156.735 m. reads 156 meters and 735 millimeters; or 156.735 g. reads 156 grams and 735 milligrams. Calculations with the metric system are easy and are made according to decimal rules. Any denominations may be reduced to the next higher by moving the decimal point to the left, or to the next lower by moving the decimal point to the right.

The Unit of Length. The unit of length is the *meter,* which is described at length in these

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volumes under its own title. The measure used for long distances is the kilometer, which is about three-fifths of a mile. We say, for instance, that Versailles is nineteen and one-half kilometers from Paris.

The Unit of Surface. The unit of surface is the square meter, that is, the area of a square each of whose sides is one meter. The multiples and subdivisions go by the square of ten, which is a hundred; thus, one square dekameter is equal to one hundred square meters, and one square decimeter is one-hundredth part of a square meter. The *are,* which has 100 square meters, and its multiple, the hektare, which has 100 ares, or 10,000 square meters, are used for ordinary land measurements. For measuring large areas, such as countries or provinces, the square kilometer is used.

The Unit of Volume. The unit of volume is the cubic meter, that is, a cube of which each edge is one meter. The multiples and subdivisions go by the cube of ten, which is a thousand; thus, one cubic dekameter is equal to one thousand cubic meters, and one cubic decimeter is equal to one-thousandth part of a cubic meter. When used for measuring wood, the cubic meter is called a *stere.*

The Unit of Capacity. The unit of capacity is the *liter,* which contains the quantity of one cubic decimeter of distilled water at its greatest density, that is at the temperature of 39.2° F. and at sea level. The liter is used for measuring liquids, such as milk, wine, and so on, and also for small fruit. For grain, vegetables and liquids in casks the usual measure is the *hektoliter.*

The Unit of Weight. The unit of weight is the *gram,* which is the weight of one cubic centimeter of distilled water at its greatest density, that is, at the temperature of 39.2° F. at sea level. One thousand cubic centimeters, which make one cubic decimeter, contain the capacity of one liter and weigh one thousand grams, or a kilogram. For weighing usual articles the kilogram is used; for heavy articles the ton, which has one thousand kilograms. Another example will further show the simple interrelation that exists between all the units of the metric system. Thus, one thousand kilograms, or a ton, is equivalent to one thousand cubic decimeters, or a cubic meter, and to one thousand liters, or a kiloliter. The United States five-cent piece weighs five grams, and has a diameter of two centimeters. One silver half-dollar weighs twelve and one-half grams. Forty dollars of United States silver subsidiary money weigh one kilogram. For fine scientific weights the unit adopted is the *microgram,* which is a thousandth part of a milligram, or a millionth part of a gram. Since 1913 the *carat,* the usual weight for measuring diamonds and other precious stones, has also been standardized. The new international carat weighs 200 milligrams, and is therefore one-fifth of a gram. The usual old carat had a weight of 205.3 milligrams.

Tables. The following are the tables of the metric system:

Measures of Length

A myriameter (Mm)	= 10,000 meters
A kilometer (Km)	= 1,000 meters
A hektometer (Hm)	= 100 meters
A dekameter (Dm)	= 10 meters

A Meter

A decimeter (dm)	= 0.1 of a meter
A centimeter (cm)	= 0.01 of a meter
A millimeter (mm)	= 0.001 of a meter

Surface Measures

A square kilometer (km^2)	= 1,000,000 square meters
A square hektometer or hektare (ha)	= 10,000 square meters
A square dekameter or are (a)	= 100 square meters

A Square Meter

A square decimeter (dm^2)	= 0.01 of a square mile
A square centimeter (cm^2)	= 0.0001 of a square mile
A square millimeter (mm^2)	= 0.000001 of a square mile

Cubic Measures

A cubic hektometer	= 1,000,000 cubic meters
A cubic dekameter	= 1,000 cubic meters

Cubic Meter

A cubic decimeter (dm^3)	= 0.001 of a cubic meter
A cubic centimeter (cm^3)	= 0.000,001 of a cubic meter
A cubic millimeter (mm^3)	= 0.000,000,001 of a cubic meter

Measures of Capacity

A hektoliter (hl)	= 100 liters
A dekaliter (dal)	= 10 liters

Liter

A deciliter (dl)	= 0.1 liter
A centiliter (cl)	= 0.01 liter
A milliliter (ml)	= 0.001 liter

Measures of Weight

A ton (t)	= 1,000 kilograms
A kilogram (kg)	= 1,000 grams
A hektogram (hg)	= 100 grams
A dekagram (dg)	= 10 grams

Gram

A decigram (dg)	= 0.1 gram
A centigram (cg)	= 0.01 gram
A milligram (mg)	= 0.001 gram

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The abbreviations given in the above tables are those officially adopted by the International Congress of Weights and Measures.

Equivalent Measures. The following tables give the equivalents of the principal units of the metric system and those of the English, Canadian and United States system:

Metric System		English Measurements	
	Length		
Meter	= 1.093 yard	Yard	= 0.9144 meter
	= 3.281 feet	Foot	= 0.3048 meter
	= 39.370 inches	Inch	= 0.0254 meter
Kilometer	= 0.621 mile	Mile	= 1.609 kilometer
	Surface		
Square Meter	= 1.196 square yards	Square yard	= 0.836 square meter
	= 10.764 square feet	Square foot	= 0.092 square meter
Square centimeter	= 0.155 square inch	Square inch	= 6.45 square centimeters
Square kilometer	= 0.386 square mile	Square mile	= 2.590 square kilometers
Hektare	= 2.471 acres	Acre	= 0.405 hektare
	Volume		
Cubic Meter	= 1.308 cubic yard	Cubic yard	= 0.764 cubic meter
	= 35.314 cubic feet	Cubic foot	= 0.028 cubic meter
Cubic centimeter	= 0.6103 cubic inch	Cubic inch	= 16.387 cubic centimeters
Stere	= 0.275 cord	Cord	= 3.624 steres
	Capacity		
Liter	= 1.056 U. S. liquid quart or [0.878 English liquid quart]	U. S. liquid quart	= 0.946 liter
	= 0.908 dry quart	Dry quart	= 1.111 liter
	= 0.264 U. S. gallon or [0.220 English gallon]	U. S. gallon	= 3.785 liters
		[English gallon	= 4.543 liters]
Hektoliter	= 2.837 U. S. bushels or [2.75 English bushels]	U. S. bushels	= 0.352 hektoliters
		[English bushels	= 0.363 hektoliters]
	Weight		
Gram	= 15.432 grains	Grain	= 0.0648 gram
	= 0.032 troy ounce	Troy ounce	= 31.103 grams
	= 0.352 avoirdupois ounce	Avoirdupois ounce	= 28.35 grams
Kilogram	= 2.2046 pounds avoirdupois	Pound	= 0.4536 kilogram
Metric ton	= 2204.62 pounds avoirdupois	Short ton	= 0.907 metric ton
Carat	= 3.08 grains avoirdupois		

These tables contain the chief units of both systems. All other measurements can be easily calculated with the aid of these tables.

The metric system having become an international system, it has been decided by delegates representing most of the civilized countries to establish an International Bureau of Weights and Measures. This bureau is now located at the entrance to the park of Saint Cloud, near Paris, on neutral territory ceded by France for that purpose. Here are kept the international standards, or prototypes of the metric system, namely, the meter and the kilogram, which are made of a special alloy of platinum and iridium. Two exact duplicates of these standard measures have been sent to every government that took part in the establishment of the international bureau. The standard duplicates sent to the United States were received by President Harrison at the White House on January 2, 1890, and are now deposited at the United States Bureau of Standards in Washington. In 1893 the United States adopted the meter and the kilogram as the fundamental standards from which the yard and pound are derived. In the United States the yard is now legally defined as $\frac{3600}{3937}$ of a meter, and the pound, as $\frac{1}{2.204622}$ of a kilogram.

Several attempts have been made to introduce the general use of the metric system in the United States. As far back as 1790 Thomas Jefferson, then Secretary of State, presented to Congress a report recommending the introduction of a decimal system of weights and measures. Again in 1821 John Quincy Adams, in a classical report to Congress on weights and measures, strongly recommended the adoption of the metric system. Several later but unsuccessful attempts have been made. O.B.

Related Subjects. The reader is referred to the following articles in these volumes:

Gram	Liter
Kilogram	Meter
Kilometer	Weights and Measures

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MET'RONOME, from two Greek words meaning *measure* and *law,* is the name of an instrument designed to enable performers to play in exact time. It consists of a weighted pendulum which swings in front of a graduated scale. This pendulum moves on a pivot and is kept in motion by clockwork. Its vibration indicates the correct time or speed at which a musical composition should be played. By shifting a sliding weight attached to the pendulum, either up or down, the vibrations are made slower or faster, the scale indicating the number of beats each minute. The metronome was patented by Johann Maalzel in 1816, but the credit for the invention belongs to Winkel of Amsterdam. For helping pupils play exercises in accurate time the instrument is useful, but anyone who should become accustomed to playing all compositions according to its beat would develop a mechanical style of performance.

METRONOME

METROPOLITAN MUSEUM, *met ro pol' i tan mu ze' um,* **OF ART,** the largest and most important art museum in the United States, located in Central Park, New York City. It had its beginning in November, 1869, when a committee was appointed to organize the project and raise an endowment of $250,000 for the purpose. The New York state legislature appropriated $500,000 for the building, a portion of which was completed in 1879. In 1902 the central part of the structure, facing Fifth Avenue, was completed at a cost of $1,200,000 to the city. A board of trustees, selected from among the membership subscribing to its maintenance, governs the museum.

The art treasures are classified in different departments and form a magnificent collection, one of the richest in the world. The department of paintings contains pictures from Old English, Dutch, Flemish and French masters, its nucleus being acquired in 1871. The Catherine Lorillard and Wolfe bequest also contained European paintings. The Benjamin Altman collection, willed to the museum in 1913, is valued at $15,000,000, while the Cesnola collection of antiquities is the richest collection of classical art in the world. The museum has received many legacies both in money and art collections and contains one of the best libraries of art in the United States.

The following examples of painting and sculpture are representative of the art treasures owned by the museum:

Madonna Colonna ..... Raphael
The Mills ..... Rembrandt
Portrait of Lady Carew .... Sir Joshua Reynolds
The Holy Family ..... Paul Reubens
The Horse Fair ..... Rosa Bonheur
Girl with a Cat ..... Thomas Gainsborough
Miss Rich Building a House of Cards .....
..... William Hogarth
Retreat from Moscow ..... Gustave Doré
Autumn Oaks ..... George Inness
Ville d'Avray ..... Jean B. Corot
Ariadne in Naxos ..... George F. Watts
Portrait of George Washington .... Gilbert Stuart
Statue of a Prince of the Julio-Claudian Family
..... (First century A. D.)
Etruscan Bronze Chariot .... (Sixth century B. C.)

METTERNICH, *met' er niK,* CLEMENS WENZEL NEPOMUK LOTHAR, Prince (1773-1859), an Austrian diplomat and statesman and chief minister of the empire for thirty years. He was born in Coblenz and educated at the University of Strassburg. At the coronation of Leopold II he represented the princes of Westphalia, when only seventeen. In 1794 he settled in Vienna and in 1795 married the granddaughter of Kaunitz, the Austrian chancellor. This alliance brought him great estates. His natural charm of manner and reputation for gallantry made him a prominent figure at the court in Vienna, and his diplomatic career began in 1803, when he became ambassador to Germany. When war was declared between Austria and France he was detained for some time by Napoleon, but when set free he eagerly entered the anti-Napoleon league. He endeavored to make Austria the chief country to profit by the reapportionment of European territory, and in the following years exercised the highest authority in Austria, almost without limit. In the Holy Alliance (which see) his diplomacy enabled him to take a leading position, and he attempted to repress all national independence. After the revolution of 1848 he was driven from power and went to England. He returned to Vienna in 1851, but never undertook to recover his prestige.

METZ, *mets,* one of the strongest military posts of Europe, in Alsace-Lorraine, built on the banks and islands of the Moselle River, about eighty miles northwest of Strassburg. It was originally a Roman camp, called Divodu-

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rum, a name changed to Metac by the Vandals. During the sixth century it was plundered by the Huns, and after that it changed ownership very rapidly. For a time it belonged to the Franks, then became a free city of the German Empire, was taken by the French in 1552 and formally given to them in 1648. In 1870 it fell to the Germans and was kept by them in the treaty of 1871, at the conclusion of the Franco-German War. During the War of the Nations it was just back of the battle line and was frequently menaced (see WAR OF THE NATIONS).

Metz has lost some of its importance commercially since it has belonged to Germany, because of the withdrawal of French capital and trade, but it is still a center for the manufacture of leather and leather goods. Arms, hats, artificial flowers, preserves, muslin and hosiery are important products. The pride of the town is the Cathedral of Saint Vincent, an example of thirteenth-century architecture. The masonry is of such a light, graceful style that it seems but a framework for the fine windows. Population, 1910, 68,600.

MEUSE, *muze,* an important river of Western Europe. It was conspicuous in the War of the Nations, as the line of its valley was followed in part by the German army in its first invasion of Belgium and France; also in the spring of 1916 and again in 1917 furious fighting occurred on its banks when the German forces made a series of desperate attacks on the forts commanding the city of Verdun, which lies at the head of navigation.

The Meuse rises in northeastern France, in the department of Haute-Marne, and first flows north through the Ardennes highlands, then northeast through Belgium into Holland. After turning westward the river joins the Waal, emptying into the North Sea through a great delta. Its length is 498 miles and for 355 miles it is navigable. The chief tributaries are the

COURSE OF THE MEUSE

(*a*) Belgium; (*b*) Luxemburg; (*c*) Lorraine; (*d*) Alsace; (*e*) Netherlands (Holland).

Sambre, Semoy, Roer and Ourthe. It is connected with an extensive system of canals in Holland and Belgium, and in its upper course it is joined by a canal to the River Saone. The principal cities in France on the Meuse are Sedan, Givet, Charleville and Verdun. Liége, where the armies of Kaiser Wilhelm met their first resistance in the war, and Namur in Belgium, and Rotterdam, Dordrecht and Roermond in Holland, are situated on this now historic stream.

MEXICAN WAR. The immediate cause of the war was the annexation of Texas in 1845. In 1836 Texas revolted from Mexico and was successful in establishing an independent republic, which was recognized by the United States in 1837. Notwithstanding the fact that Texas had been recognized by several of the leading European nations, as well as by the United States, Mexico never acknowledged its independence. There was constant friction between Texas and Mexico, and the latter had warned the United States that the annexation of Texas to the American Union would be considered as a declaration of war. The Texas question had been before the country for a number of years, and it was a prominent issue in the Presidential campaign of 1844, the Democrats favoring and the Whigs opposing annexa-

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tion. The Democratic candidate, James K. Polk, was elected, and the addition of Texas to the Union was the first important measure of his administration.

Had the United States adopted conciliatory measures it seems probable that war might have been prevented, but a dispute arose over the western boundary of Texas and this still further aggravated the Mexicans. Texas claimed the Rio Grande as its western boundary, and Mexico claimed that the Nueces River, a stream about 100 miles further east, was the boundary. The territory in dispute had an area of about 2,000 square miles, and President Polk did not intend to await diplomatic negotiation to secure it; he therefore ordered General Taylor, who was stationed on the Nueces with a force of about 3,000 men, to proceed to the Rio Grande. Taylor's advance was answered by a counter advance by the Mexicans into the same territory, and on April 23, 1846, a small detachment of Americans was defeated by a body of Mexicans. President Polk sent a message to Congress declaring that a state of war existed "through the act of Mexico herself." On May 13 Congress declared war and immediately voted money and supplies for its prosecution.

The Campaigns. The war was conducted under four campaigns—the campaign along the Rio Grande under the command of General

TAYLOR'S CAMPAIGN

Zachary Taylor, against Mexico City under General Winfield Scott, in California under Admiral Stockton and Captain John C. Fremont, and in New Mexico under General Stephen W. Kearney. The important battles of the Mexican War are described under their respective titles; only a summary of the events of each campaign is included in this article.

Taylor's Campaign. On May 8 Taylor defeated a superior force of Mexicans at Palo Alto and the following day at Resaca de la Palma. On May 18 he captured Matamoros, where he remained until September, when he advanced upon Monterey, which he entered on September 24, after a short siege. About 10,000 of his troops were then ordered to join the forces of General Scott, who had appeared off Vera Cruz and was preparing to advance upon the City of Mexico. A copy of this order fell into the hands of Santa Anna, the Mexican commander-in-chief, and he at once advanced with a large army against Taylor, who had stationed his army at Buena Vista. The engagement resulted in a disastrous defeat for the Mexicans and a brilliant victory for the Americans. Soon after the Battle of Buena Vista Taylor resigned his command and returned home.

Scott's Campaign. General Scott, who as ranking general was commander of all the American forces in Mexico, appeared before Vera Cruz on March 7, 1847, with an army of 12,000 men. After a siege of three weeks the city was taken and the way to the city of Mexico was open. Two months after the fall of Vera Cruz Scott began his march towards the enemy's capital. His path was beset with difficulties, and considering the size of his army his undertaking was hazardous. He stormed the pass at Cerro Gordo and pressed on towards Puebla, driving the Mexicans before him. The Americans remained at Puebla until August, when the march was resumed. On August 19 and 20 three battles were fought, at Contreras, San Antonio and Churubusco, respectively, about ten miles from the city of Mexico. In all these engagements the Mexicans far outnumbered the Americans, but the superior skill and bravery of the American officers and troops enabled them to win decisive victories. An armistice of three weeks followed the Battle of Churubusco, then the Americans advanced to the city's gates. They won a brilliant victory at Molino del Rey, and on September 13 stormed the heights of Chapultepec. The next day Scott's victorious army entered the capital of the Montezumas, and the war was practically at an end. The map of Scott's route to the capital appears in the illustration heading this article.

Other Campaigns. While Taylor was advancing up the Rio Grande, the American forces

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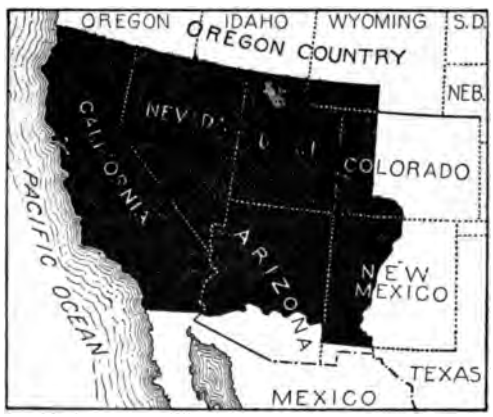
under Kearney had occupied New Mexico and a detachment under Colonel Doniphan had taken possession of important territory around Chihuahua. Meantime, Stockton and Fremont had established American control over California, so all the territory between the western boundary of the Louisiana Purchase and the Rio Grande was under the control of the United States.

The Treaty of Peace. The superior generalship and training of the American forces had enabled them to win every battle, although they were confronted by superior numbers, and the Mexicans fought bravely. The disastrous effects upon Mexico were such that for a time there was no recognized authority with which a treaty of peace could be negotiated, and it was not until February 2, 1848, that the Treaty of Guadelupe Hidalgo was signed, and not until May that it was ratified.

During the course of the war about 43,500 American soldiers served in Mexico or on the northern border; of these, slightly more than half were volunteers, the remainder being regulars.

Results of the War. The results of the Mexican War were more far-reaching than even its strongest supporters anticipated. The immediate cause of the war has already been stated, but in order that the results may be understood,



WHAT MEXICO GAVE TO THE UNITED STATES

a reference to the indirect causes is necessary. By the terms of the Missouri Compromise (which see) slavery was prohibited north of the boundary 36° 30″. Texas was the last state within which slavery was possible that could be admitted to the Union, unless new territory south of this limit could be secured, while north of this boundary there was territory out of which a number of new states could be organized. This meant that the free states would soon have a majority in the United States Senate, and the proslavery faction in Congress hoped that new slave territory might be secured through a war with Mexico. Moreover, President Polk's ambition was to gain for the United States all the territory between the western boundary of the Louisiana Purchase and the Mexican border. In this he was successful, since its defeat compelled Mexico to sell this territory to the United States for a nominal sum, $18,250,000. The introduction into Congress of the Wilmot Proviso, however, prevented this newly-acquired possession from being declared slave territory.

The direct results of the war were, first, the addition of over 525,000 square miles of territory to the United States, from which have been organized the states of California, Nevada, Utah, a part of Colorado, most of Arizona, Western New Mexico, and a small part of Wyoming. The second result was the reorganization of the political parties along the lines of antislavery and proslavery. Strange as it may seem, the party that won the war was defeated at the next Presidential election, and General Taylor, the hero of Buena Vista, became President.

The indirect results were, first, the prestige which the acquisition of an extended coast line on the Pacific gave the United States; second, the development made possible by the discovery of gold in California and the consequent addition to the nation's resources; third, the launching of the doctrine of squatter sovereignty (which see) that became one of the steps leading to the War of Secession, and fourth, the training which this war afforded officers who were to take prominent parts in that great struggle—among them being George B. McClellan, George G. Meade, U. S. Grant, William T. Sherman, Robert E. Lee, Jefferson Davis and "Stonewall" Jackson. W.F.Z.

Consult McElroy's *The Winning of the Far West*; Wilcox's *History of the Mexican War*.

Related Subjects. The reader is referred to the following articles in these volumes:

Buena Vista, Battle of
Chapultepec, Battle of
Churubusco, Battle of
Fremont, John C.
Guadalupe Hidalgo, Treaty of
Mexico, subtitle *Government and History*
Monterey, Battle of
Palo Alto, Battle of
Polk, James K.
Resaca de la Palma, Battle of
Scott, Winfield
Taylor, Zachary
Texas, subhead *History*
Wilmot Proviso

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MEXICO, the southernmost country of North America, excepting the small states of Central America, is a great republic which, because of its nearness to the United States, has always been of great interest to the latter country. "The Land of Mañana," which means "The Land of To-morrow," it is sometimes humorously called; for its people, indolent because of the tropical climate, and listless because of the misery and poverty which have been their lot for many generations, show an unconquerable tendency to put off all progress and effort "hasta mañana"—"until to-morrow." Narrowing rapidly from north to south and curving toward the east, Mexico is in shape somewhat like the old "horn of plenty." Two great peninsulas jut out from the mainland—in the south Yucatan, which turns northward and encloses a broad curve of the Gulf of Mexico; in the northwest Lower California, separated from the western coast of the mainland by the Gulf of California.

Its Position and Measurements. Mexico stretches from latitude 15° to 33° north, thus lying through half its length in the torrid zone, and through the other half in the north temperate zone. Since its form tapers sharply, the area of the northern or temperate portion is the greater, yet Mexico is commonly regarded as a tropical country. On the north California, Arizona, New Mexico and Texas are its neighbors, the last-named state being separated from it by the famous Rio Grande, which forms over 1,100 of the 1,833 miles of the northern boundary line of the country. To the east are the Gulf of Mexico and the Caribbean Sea, to the south British Honduras, Guatemala and the Pacific Ocean, while the whole western boundary is formed by the Pacific Ocean and its long, narrow arm—the Gulf of California.

LOCATION MAP

The border line with the United States marks its greatest east and west breadth, and the Isthmus of Tehuantepec, 134 miles across, is its narrowest point. Its greatest length, from northwest to southeast, is about 1,900 miles, and its total area is 767,055 square miles. It is thus about three times as large as Texas, and a little larger than the Canadian provinces of Quebec, Nova Scotia and New Brunswick, or than the whole north-central division of the United States. Among the nations of the Western hemisphere four—Canada, the United States, Brazil and Argentina—surpass it in size, but only the United States and Brazil have a greater population (see population statistics, under subtitle below).

The People of Mexico

What Is a "Mexican?" Mexico had in 1910 a population of about 15,112,600 people; an accurate census has never been taken because of the superstitious fears of the people. When a census taker appears they conceal from him as many facts as possible, thinking that he may do them harm in some way—at the very least make them pay heavier taxes. The people are for the most part very ignorant; this is not strange when it is considered that out of the whole population only nineteen per cent may be classed as pure whites, while the remaining eighty-one per cent are Indians or of mixed Indian and white blood. The typical Mexican, then, is quite sure to have Indian blood in his veins and to have inherited with it most of the superstitions, the customs and the vices which his Indian ancestors possessed four centuries ago, before the Spanish conquest. See subtitle, *Government and History.*

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COMPARATIVE AREAS

At left, Mexico is shown as large enough to cover that section of the United States which appears in black. At right, the British Isles are shown set into Mexico, the two being drawn to the same scale.

It is somewhat difficult to give the characteristics which distinguish Mexicans, so poorly have the different Indian tribes been assimilated; but for the most part it may be said that, whether Indian or half-breed, they are pleasure-loving, fond of ease, unreliable and totally incapable of understanding the principles of wise and sane living. The wages they earn are all too small, but whatever they can save above the bare necessities of life they almost invariably spend foolishly. Particularly strong is their love for intoxicating liquors, and every festive day serves as an excuse for excessive drinking.

Living Conditions. The foreigners, of whom there were about 100,000 in the country before the revolutions which began in 1911, have introduced so far as possible their own modes of life, and the results are notable in the large cities. Here, to some extent, European and American methods have been introduced, and it is frequently possible for the traveler to find a fairly good hotel with electric lights and only a moderate amount of dirt, instead of the indescribable lodging houses of the past. The "native whites," if so they may be called, are Spaniards; and many of them live in a style which has much of display if very little of solid comfort.

But the mass of the people, the Indians and half-breeds, live in the most squalid poverty. Their little one-story houses of adobe, or sun-dried brick, lack all means of comfort and of sanitation, and the death rate, especially from filth diseases, is very high. Having resisted all progress for centuries, they live to-day on the same food which satisfied their ancestors hundreds of years ago, and for the most part they cook it in the same way. There are *tortillas*, or thin cakes of corn, and *frijoles*, or black beans, cooked with the pungent red peppers of which they are so fond; these are the staple articles of food the year round. Even such variation of diet as the poorest family can hope for in the United States or Canada is unknown to these Mexicans. Indeed, it is scarcely fair to compare the present Indians of Mexico with those that Cortez found there, for the latter were in a more advanced state of civilization.

TYPICAL ADOBE HOUSE
(See the article ADOBE.)

The official language of Mexico is Spanish, but the Indian tribes have clung steadfastly to their own languages, which are numerous.

Education. The government of the republic has not neglected the question of education, but the task before it is an appalling one. Every state has free primary schools, and each has compulsory education laws, but in the disordered condition of affairs which has prevailed almost without cessation since the founding of the republic these have not been enforced, and illiteracy is still widespread. Among most of the Indian tribes no progress has been made, for it has never been possible to convince them that there could be the slightest value in education; two tribes, however, the Mixtecas and Zapotecas, have been more progressive, and some of the foremost men of the nation have come from them.

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In addition to primary schools, almost 1,000 in number, which are supported in part by the Federal government and in part by the states and municipalities, there are a number of secondary schools, normal schools and professional schools. The United States is proud of the institutions of higher learning which were founded in its very early history, but Mexico had a university in 1553—before the vast region to the north of it had even been explored. For over three centuries, until 1862, this institution carried on work, but in that year it closed its doors. In 1910, however, it was reorganized, and bids fair to exert a strong influence on educational affairs in Mexico.

Religion. Mexico has no state Church, but no country with an established religion has people more uniformly of one faith. The Roman Catholic Church, to which most of the people belong, has always had an important place in the history of the country; indeed, missionaries fired with zeal for the conversion of the Indians were among the very first arrivals. Most of the Indians are, nominally at least, converts to Christianity, but they cling to many heathen rites and superstitions, often sacrificing in secret to the gods their ancestors worshiped before the coming of the Spaniards in the sixteenth century.

It was not until 1859 that Church and State were separated in Mexico and the vast properties which had been accumulated by the Church nationalized. At about that time freedom of faith was allowed. The various Protestant denominations took advantage of this liberty to send missionaries into Mexico, and their work has continued steadily ever since. Growth has been slow, however, and at present all the Protestant churches together have a membership below 25,000.

The Geography of Mexico

Its Coast. Mexico has a total coast line of about 6,300 miles, of which 4,574 miles are on the Pacific Ocean and Gulf of California. All along the eastern border the shore is low and sandy, presenting few points of interest except where the mountains approach the coast closely enough to be seen from the shore. The ports on this Atlantic side are by nature almost worthless, but much money has been spent on making certain of them, as Tampico and Vera Cruz, secure and commodious. On the Pacific coast, on the other hand, there is a series of excellent ports, Acapulco, especially, comparing well with almost any other port in the world. But these present no such busy scenes as does San Francisco Bay, for instance, farther north on the same coast; indeed, some of them are scarcely valuable, because they are shut off by towering mountains from the industrial centers of the country. The western shore line is for much of its length as flat and monotonous as the eastern, but at intervals offshoots from the country's great mountains run down to the sea and there break off abruptly and picturesquely.

Its Surface. There are three well-marked surface regions in Mexico. These are a great central plateau; two border ranges, one on the east and one on the west; and a fringe of coastal lowland, in places very narrow. The great force in making Mexico geographically what it is to-day has been volcanic action, and the high plateau was built up very largely from the outpourings of volcanoes. In the south the table-land is 8,000 feet above sea level, but it slopes gently to the north, and at the United States boundary line is only 3,600 feet in altitude. Rising above its surface here and there are mountain peaks, which would appear much taller were it not for the general high level of the plateau.

Dividing this plateau region from the "hot lands" of the coast, which vary in width from ten to one hundred miles, are the Sierra Madre Oriental, on the east, and the Sierra Madre Occidental, on the west. The latter range has throughout its extent an average height of more than 10,000 feet. As the country narrows toward the south these border ranges approach each other more and more closely, and finally join in a wild jumble of peaks and valleys, somewhat north and west of the narrowest part of the country. Here are to be found wonderful, shapely volcanic peaks, three of which are snow-crowned all the year, even in a region where the limit of the eternal snows is 15,000 feet. These three are *Orizaba,* which the ancients called Citlaltepetl, or Star Mountain, the tallest peak in the country, 18,250 feet in height; the famous *Popocatepetl,* or Smoky Mountain, 17,520 feet in height; and *Iztaccihuatl,* or White Woman, 16,960 feet, from whose snow crown great glaciers push downward. There are other peaks, also, and most of them are volcanic; but there is one small volcano, only 4,330 feet in height, which has a peculiar fame. *Jorullo,* it is called, and ac-

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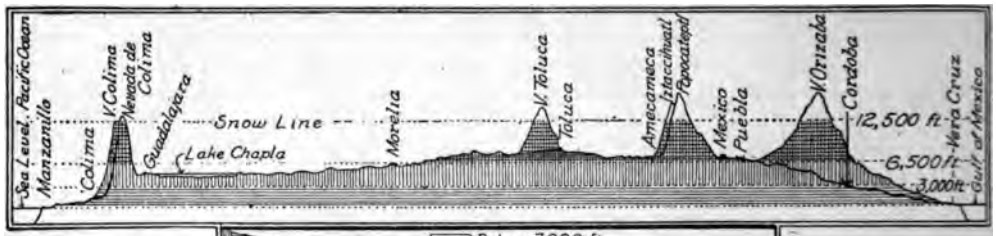

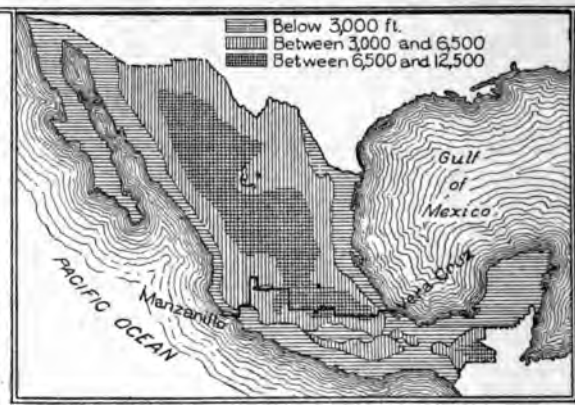

ELEVATION ACROSS MEXICO

The irregular black line across the lower map is the path of the cross section shown above from ocean to ocean, from Vera Cruz on the east to Manzanillo on the west.

cording to the story of the natives it rose above the plain in a single night of terrific activity, late in 1759. Most of the Mexican volcanoes are extinct, but some of the famous ones still show signs of life, sending out constant jets of steam and gas which melt the snow around their crater mouths.

The two peninsulas of Mexico are very different in character. Lower California is an arid, sandy region, with a backbone of mountains which reach a considerable height; while Yucatan is very flat and level, throughout most of its extent not far from 100 feet in altitude.

Waters. Once upon a time Mexico had a great river, the Rio Grande, entirely within its borders; but when a large stretch of territory was given up to the United States after the Mexican War in 1848, this river was made the boundary line between the two republics, and now the river belongs in part to each. So much of its water is drawn off to irrigate the dry land through which it flows that through part of the year it is little more than a sand bed. Of other rivers there are few of any importance, the great plateau with its bordering mountains making streams of any length impossible. Occasional rapid torrents descend to the sea from the plateau, but the unequal distribution of the rainfall throughout the year and the absence of forests make of them flood streams at certain seasons and dry gullies at others. It may be said almost literally, therefore, that Mexico has no inland water transportation.

The country is not much better supplied with lakes, though some of the plateau valleys have chains of lakes, which seem slowly to be drying up, and the coast regions have in places tide-water lagoons. The only lake of any considerable importance is Chapala, which has a length of eighty miles and a breadth of from ten to thirty-five miles. It is one of the favorite resort regions for wealthy Mexicans, whose attractive country houses line its shores.

Climate. Parts of Mexico, in the moist, fever-breeding lowlands along the coast, have a very unhealthful, as well as disagreeable, climate, but throughout much of the country climate conditions are exceedingly attractive. Since the country stretches through seventeen degrees of latitude, it presents considerable variations in climate, but it is altitude rather than latitude that causes the differences. There are three distinct zones of climate which depend upon elevation. Along the coast, and extending to a height of about 3,300 feet, are the *tierras calientes,* or hot lands, which have an average yearly temperature of from 77° to 82°, and rarely reach lower than 60°. Next are the *tierras templadas,* or temperate lands, from 3,300 to 5,600 feet above sea level, which have an average temperature of from 62° to 70° and produce the crops of subtropical regions as well as those of temperate climes. Above these are the so-called *tierras frias,* or cold lands, but in reality they are not cold at all, as they seldom experience a frost. It is in the lower regions of these cooler lands that the population is densest.

The rainfall is extremely uneven, much of the plateau having only from twenty-five to thirty inches in a year, while the coastal regions of the east have as high as 120 inches.

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Resources and Industries

. A mention of the minerals of calls thoughts of early days when rds came seeking the precious metals y had heard that the country pos- abulous quantities. The adventurers ı were not deceived in their dreams, ıntries in the world have vaster min- ces. Much gold is there, and though the expense of mining it prevented uction, the output has in recent years very decidedly. But the great min- er, of which Mexico, when not torn ions, produces thirty per cent of the pply. Every state has its silver mines, ıre richest and most numerous in the part of the plateau. There is copper, ron in great quantities, with lead, tin ır, but the production of all of these ed by lack of fuel. Mexico has coal they are so far from transportation they cannot be worked with profit, of the coal is imported from England ıited States and sold at as much as Needless to say, most of the people other fuel, but wood is very little Within the last two decades petro- been discovered, and is now being in great quantities. Tampico is the this industry, and the Tampico fields main source of supply for Britain's s during the War of the Nations.

le Growth, and Agriculture. The were throughout much of their occu- deeply interested in mining that they attention to tilling the soil, so agri- ursuits gained slowly. Even in those ever, the value of many of the native plant life was recognized. The dense ests of the hot lands have palms and ıahogany, rosewood, ebony and iron- es, and olives and almonds, while grow oaks, pines and firs. Other native, have been introduced, and ıtations of rubber trees promise a the rubber industry. Then there is , or American aloe, a spinous, un- ooking plant which forms the basis f the chief industries of the country. species is produced a fiber known as p, which is exported in great quanti- another a white juice which ferments very intoxicating liquor—the *pulque* he national drink of the Mexicans and of much of their unprogressiveness.

The crops are many and of great variety. Coffee, cotton, sugar cane, tobacco, corn, the favorite frijole beans, wheat, vanilla, indigo—in fact, almost anything which will grow in temperate or tropic climates thrives somewhere in Mexico. There are also fruits—apples in the highlands, and lemons, oranges, bananas and pineapples in the warmer parts. Even with all these, the development of Mexico's resources has but begun. The great lack is water, but when this can be drawn from the mountains and given by irrigation to the fertile but dry plateau lands, Mexico will indeed blossom like the rose.

Stock-raising has always been of importance since early Spanish days, and to-day it is one of the chief industries. The Mexican cowboy is as fearless and as skilful in managing his great herds as is his brother in the United States, and it was from the Mexicans that the American cowboy learned the use of the lasso. The cattle, horses and sheep are for the most part small and of rather inferior grade, but in recent years much has been done toward improving the various breeds.

Manufactures. One thing which President Diaz did for Mexico during his rule of over thirty years was to make conditions secure enough so that manufacturing might make some headway, for before his time Mexico was distinctly a nonmanufacturing country. Even to-day few articles are manufactured in sufficient quantities for export, but there was a decided advance, which was nearly stopped by the revolutions after 1911. Cotton cloth, tobacco, sugar, liquors, woolen goods of inferior quality, glass, chocolate and molasses are some of the chief articles of manufacture. Such distinctive products as the high-crowned, wide-brimmed hats; the elaborate saddles; and the pottery, baskets, mats and feather work of the Indians are on sale in every market place, and form part of the return baggage of nearly every visitor to Mexico.

Transportation and Commerce. After the first railroad, a very short line, was built in Mexico in 1854, development was slow for a score of years. Since that time the lines have been rapidly extended and improved, and at present there is in the country a total of about 16,000 miles. All the important cities have rail connection, and Mexico City is a busy railroad center. The government owns a controlling share in most of the large lines, and the plan

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NATIONAL PALACE, CITY OF MEXICO

is that sooner or later all the roads shall be government owned. The large cities also have street railways, some of them operated by electric power, some by more primitive means.

Because of its large production of metals, the exports of Mexico surpass its imports, for each year about $95,000,000 worth of minerals are sent out. The total exports, which include sisal hemp, hides, coffee, building woods, cattle and rubber, amount in a year to about $150,000,000, while the imports, consisting largely of textiles, machinery and foodstuffs, are valued at nearly $100,000,000 in normal times. The United States furnishes about one-half of the imports and receives over three-fourths of the exports, Great Britain ranking second.

Government and History

The Constitution. The first constitution was adopted on February 5, 1857, the second, in May, 1917, after General Carranza had partially pacified the country (see *History*, below). It provides for the Federal republic as it has long existed, consisting of twenty-seven states, three territories, and a Federal District. The latter comprises the capital, Mexico City, and adjoining territory. Of the individual states it demands that they, too, have representative republican governments, but it leaves them nearly supreme in local affairs. The new constitution is particularly displeasing to the United States, as it limits the enterprise of Americans and Europeans in the republic.

Departments of Government. At the head of the republic is a President, who with the Vice-President is chosen for a term of four years, by electors who are selected by popular vote. Though given by the Constitution only such powers as are usual to the President of a republic, the Presidents of Mexico have practically all been dictators, supreme while they held their power. To assist the chief executive in his functions there is a Cabinet composed of the heads of the eight departments of foreign relations, interior, justice, public instruction and fine arts, industry and colonization, communication and public works, finance, and war and marine.

The legislative branch consists of two houses, a Senate and a Chamber of Deputies. Senators, one-half of whom are elected every two years, hold office for four years and are fifty-six in number, two being chosen from each state and two from the Federal District; representatives, one of whom is elected for each 40,000 inhabitants or fraction thereof over 20,000, are elected for two years.

At the head of the judiciary is a supreme court of fifteen judges, elected for six-year terms, and below this there are district and

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circuit courts, while each state has its supreme and inferior courts.

Cities. The largest city of Mexico is Mexico City, and it is also the capital. Other cities are Guadalajara, Puebla, San Luis Potosi, Merida, Aguas Calientes, Morelia, Chihuahua, Guanajuato, Leon, Vera Cruz, Saltillo, Oaxaca, Juarez and Pachuca. The most important of these are given separate articles in these volumes.

Early History. The name *Mexico* is probably derived from that of the old war god, *Mexitl,* who was worshiped by the Aztecs. These were not the first dwellers in Mexico, but are supposed to have entered the country late in the twelfth century. Wonderful indeed was the civilization they built up about their capital city of Tenochtitlan, which stood where Mexico City stands to-day; but with all their power they were not strong enough to resist the conquerors who came early in the sixteenth century. These were the Spaniards, who under their famous warrior-leader, Cortez, overthrew Montezuma, the Aztec emperor, and made themselves masters of the city. In all the history of the Western world there is no more thrilling chapter than that which describes the heroic fight of the Aztecs against the invaders. See CORTEZ; MONTEZUMA.

The Spanish Period. Cortez called this land which he had won *New Spain,* and of it he was made captain-general. For just three centuries after he conquered it in 1521 it remained Spanish territory. Spaniards flocked to the promising new country, and in 1535 the first viceroy was appointed. But though in the long line of his successors there were some good men, the Spanish policy on the whole was selfish, permitting the exploitation of the country by the Spanish nobles. Decided advance was made along certain lines, however, for exploring parties were sent out into the lands to the north which now form part of the United States, and Christianity was introduced among the Indians of these regions as well as among those of Mexico.

The selfishness and the oppressive measures of Spain led to constant and ever-increasing restlessness and discontent, which culminated in 1810 in open revolt. The leader of this insurrection was a parish priest, Hidalgo, who took as his motto, "Long live America, and death to bad government!" The defeat and death of Hidalgo did not put a stop to the rebellion, which flamed more and more fiercely until, in 1821, independence was assured.

Freedom. Mexico was free, but it had no ruler, and embassies were sent to Europe to try to induce a prince of the House of Bourbon to accept the throne; for as yet a republic was not thought of. No one could be found, however, and in 1822 Iturbide, the general who had had most to do with securing independence, had himself proclaimed emperor. All parties did not favor his claims, and in the next year he was forced to resign, and in 1824 a republic was formally proclaimed. The troubles of the country had but just begun. The people were not used to governing themselves and did not know how, and force of arms rather than the ballot usually decided an election. Presidents were forced out of office by revolts; other Presidents refused to give up the office when their terms had expired, and only a very strong man with the powers of a dictator could give to the country even a semblance of peace. One of these dictator Presidents who held the affairs of the country in his hands for a long time was Santa Anna (which see), and he was still in the forefront when war broke out with the United States.

Texas had made itself independent in 1836, and ten years later disputes over boundaries led to war with the United States. Nothing can give a clearer idea of the troubled conditions in Mexico than the fact that during the war, which lasted but two years, the Presidential chair was vacated and refilled twelve times. Naturally, the fighting force could not be effective with such a state of affairs behind it, and by the treaty which closed the war Mexico surrendered all of New Mexico, which included a vast extent of territory not included in the present American state of New Mexico.

Still the internal disorder kept up, one man after another coming to the fore, ruling for a time with a high hand and sinking into the background again. Most noteworthy of these middle-of-the-century dictators was Juarez, a full-blooded Indian, who showed himself possessed of very unusual powers. His hold upon Mexico was loosened in 1862 when a French army entered the country, and in the following year Mexico was proclaimed an empire and its crown was offered to Maximilian, archduke of Austria. His rule, though honest and wise, was not popular in the country, and when the French troops were withdrawn early in 1867 he found himself utterly without backing. Insurrection broke out, and the unfortunate emperor, betrayed by a trusted general, was captured and put to death.

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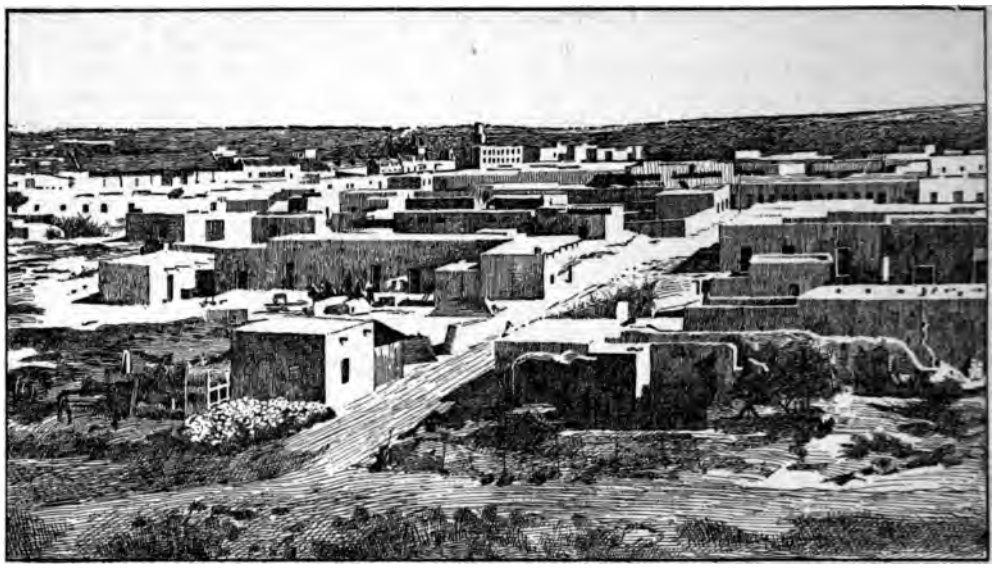

THE CITY OF PARRAL

Typical of the architecture of the interior towns of the republic, and interesting to Americans, as the city was the southernmost point reached by the expedition of General Pershing.

The Great Dictator. This title belongs by right to Porfirio Diaz, who became President in 1876. With his advent began the first period of real development for Mexico. Under him the government was not the weak, uncertain affair that most of the Presidents had made it, and peace, though founded upon fear, was nevertheless a real thing for the first time since the declaration of the republic. Since there was a law which declared that a President could not serve a second term, Diaz was not reëlected in 1880, but it became clear that he was the man the country needed, and the laws were changed to permit of his continuous reelection. Until 1911 he held office, and a prosperity unknown before descended upon Mexico. Industries were developed; foreign capital poured into the country, since there was a feeling that the government was strong enough to protect it; an educational policy was mapped out; everywhere new public buildings came into being—in a word, Mexico was in a fair way to become a thriving, modern nation.

Civil War. But the rule of Diaz, though benevolent in the main, could not please everyone, and late in 1910 a revolution, headed by Francisco Madero, broke out. This resulted, in the following year, in forcing Diaz to resign and to flee to Europe, while Madero was elected President. But the spirit of insurrection was in the air, revolts broke out on all sides, one of which grew to such proportions as to compel the resignation of Madero and his Vice-President early in 1913. Four days after his resignation Madero was murdered, and General Huerta, who had headed the revolt, became President. The United States refused to recognize the government of Huerta, and strained relations between the two countries ensued, but President Wilson proclaimed a "watchful waiting" policy, and actual intervention did not take place at that time.

Here and there throughout the country revolution and counter-revolutions were in progress, Venustiano Carranza and Francisco Villa playing specially important parts. To paraphrase Kipling, it appeared that Mexico was rapidly

INTERNATIONAL BRIDGE

The wooden structure between El Paso and Juarez, over the Rio Grande. It has become famous since relations between the two countries were less cordial than formerly.

drifting toward a condition where "Never a law of God or man runs south of thirty-two." The lives and property of citizens of other countries living in Mexico were constantly being threatened, and in April, 1914, the arrest

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OUTLINE AND QUESTIONS ON MEXICO

Outline

I. Position and Size

(1) In southern part of North America
(2) Latitude
(3) Longitude
(4) Neighboring countries and boundaries
(5) Area
  (a) Actual—767,055 square miles
  (b) Comparative

II. Physical Features

(1) Coast line
  (a) Length
  (b) Character
(2) Three surface regions
  (a) Central plateau
  (b) Border ranges
    1. Sierra Madre Oriental
    2. Sierra Madre Occidental
    3. Outstanding peaks
(3) Coastal lowlands
(4) Two peninsulas
  (a) Yucatan
  (b) Lower California
(5) The Rio Grande
(6) Absence of other important streams
(7) Scarcity of lakes

III. Climate

(1) Unhealthful lowlands
(2) Attractive plateau conditions
(3) Three climatic zones
(4) Rainfall

IV. Industries and Commerce

(1) Mining
  (a) Part taken by gold mining in history of country
  (b) Other minerals
(2) Agriculture
  (a) Great variety of crops
  (b) Slow development
  (c) Stock raising
(3) Slight development of manufactures
(4) Exports and imports
(5) Transportation

V. The People

(1) Racial variations
(2) Characteristics
(3) Living conditions
(4) Education
(5) Religion

VI. Government and History

(1) Republican form
  (a) Departments
(2) Early history
(3) Spanish period
(4) The republic
  (a) Troubled conditions
  (b) The "great dictator"
  (c) Recent civil war

Questions

What constitutes the chief food of the mass of people in Mexico?

How does it happen that this country, which once had a great river within its borders, no longer has it?

How many Presidents did Mexico have during the Mexican War?

What are the *tierras calientas?* The *tierras templadas?* Locate them both.

What part did the "A B C powers" take in the history of Mexico?

When was a mountain built in a night?

When and under what circumstances was "Death to bad government" a rallying cry?

How large a proportion of the Mexicans have Indian blood in their veins? How does this influence the character of the people?

What has been the great force in the making of Mexico geographically?

From what was the name *Mexico* probably derived?

How many nations of the Western hemisphere have a larger area?

How does the coast line compare in length with that of the United States?

What resource of the country brought its first European visitors?

What has hampered the development of agriculture? Of mining?

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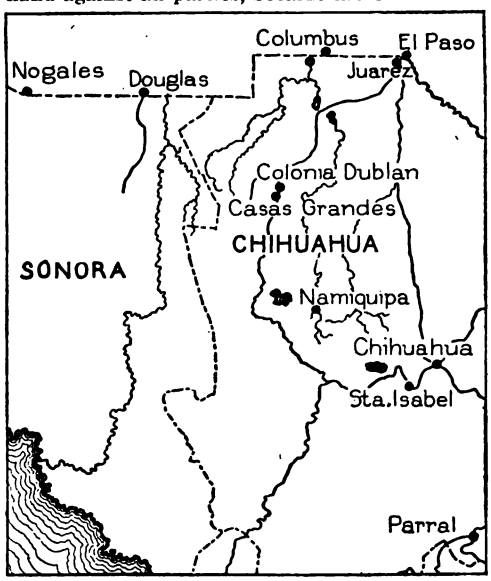
of a number of United States marines at Tampico led to the despatching of the American fleet to the Gulf of Mexico. War seemed imminent, but it was finally averted by the friendly intercession of the so-called "A B C" powers—Argentina, Brazil and Chile. In July, 1914, Huerta resigned, and Carranza became Provisional President, but Villa, heretofore his adherent, refused to support his claims, and Zapata also set up an independent government in the south. There seemed no solution of the vexed problem; the recognition by the United States of Carranza as *de facto* President did little to settle the matter. Villa, his hand against all parties, became more and more



MAP OF CHIHUAHUA STATE
Location of the events connected with the expedition from the United States in 1916.

daring in his depredations, and at length made it evident that he had no more respect for the authority of the United States than for that of his successful rivals in his own country. Finally, early in 1916, he began crossing the border into Texas and New Mexico, and there on his raids, particularly at Columbus, N. M., on March 8, put to death peaceful American citizens. In March the United States government sent troops into Mexico under Generals Funston and Pershing to capture the bandit chief. The direct command of 12,000 men, under Pershing, penetrated 500 miles below the Rio Grande and remained there inactive until February, 1917, when the government of the United States ordered it home. Official inaction, due to friction with official Mexico, made it impossible to accomplish what it was sent to perform. Over 100,000 state militiamen were mobilized and sent to the border for patrol duty, and no state's quota remained there less than six months; many regiments were yet there in June, 1917, owing to threatened trouble from an attempt of Germany to participate in the affairs of Mexico, after relations between the United States and the German Empire were suspended.

On May 1, 1917, a new constitution went into effect, the result of many weeks of work on the part of the Carranza government. During April a national election was held, and Carranza was elected President of the republic. The last constitutional President had been Madero, who was assassinated February 22, 1913, by the Huerta régime. A.MCC.

Consult Turner's *Barbarous Mexico;* Lummis's *The Awakening of a Nation;* Fornaro's *Carranza and Mexico;* Reed's *Insurgent Mexico.*

Related Subjects. The following articles in these volumes will give more detailed information on certain phases of Mexican geography and life:

CITIES

Acapulco	Mexico
Aguas Calientes	Monterey
Campeachy	Morelia
Chihuahua	Puebla
Durango	San Luis Potosi
Guadalajara	Tampico
Guanajuato	Vera Cruz
Leon	Zacatecas

HISTORY

Aztecs	Maximilian
Carranza, Venustiano	Mexican War
Cortez, Hernando	Montezuma
Diaz, Porfirio	Santa Anna, Antonio Lopez de
Huerta, Victoriano	United States, subtitle *History*
Iturbide, Agustin de	Villa, Francisco
Juarez, Benito Pablo	
Madero, Francisco	

LEADING PRODUCTS

Cattle	Rubber and Rubber Manufacture
Coffee	Sheep
Copper	Silver
Gold	Sisal
Horse	
Pulque	

MOUNTAINS

Popocatepetl	Sierra Madre

UNCLASSIFIED

California, Lower	Tehuantepec, Isthmus of
Rio Grande	Yucatan

MEXICO, Gulf of, a great arm of the Atlantic Ocean which forms what is in effect a huge inland sea on the eastern coast of North America. It is almost entirely surrounded by the United States and Mexico. The southern-

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most tip of the Florida peninsula and the northeasterly point of Yucatan are 450 miles apart; a line drawn between these points marks roughly the southern limits of the Gulf, where it joins the Caribbean Sea. Midway in the

LOCATION MAP

opening between Florida and Yucatan lies the island of Cuba, and the open sea is reached only by means of two passes, the Straits of Florida and Yucatan Channel. This great oval basin, with an east and west length of 1,100 miles, a breadth of 800 miles and an area of almost 700,000 square miles, has 3,000 miles of low, level coast line, broken only by countless lagoons and salty marshes shut off by the sand bars. The low, sandy shores make few good harbors, but the Gulf possesses the important ports of Vera Cruz, Galveston, Mobile, Pensacola, Tampa and Havana.

Off the coast of Mexico the depth of water is in places 12,700 feet (nearly two and a half miles), while over a large area in that vicinity it averages 12,000 feet, but elsewhere 10,000 feet is the maximum. The Yucatan Channel and the Straits of Florida are not nearly so deep, and there are many shallow places with gently-sloping bottoms, where the rivers pour in their sediment. Chief of these rivers is the Mississippi; others which pour their floods into the Gulf are the Rio Grande, the Colorado of Texas, the Mobile and the Apalachicola. On the low coast of Florida and Yucatan there are numerous little "keys," as they are called, but save for these and Cuba the Gulf has no islands.

No feature about the Gulf of Mexico is more noteworthy than the Gulf Stream. Entering from the Caribbean Sea by the Yucatan Channel, it flows about the coast, raising the temperature of the Gulf eight or nine degrees above that of the Atlantic in the same latitude, and finally issues into the Atlantic by way of the Straits of Florida. It is difficult to overestimate the influence of the Gulf of Mexico on the climate of the surrounding region, or even on that of places far to the northward. Many places in the Mississippi Valley have a warmer climate than would be possible were it not for the warm winds which sweep up from the Gulf, while the spring rains which flood the tributaries are due in large measure to the moisture-bearing breezes from the south. See GULF STREAM. A.MC C.

MEXICO CITY, the metropolis of Spanish-speaking North America and the capital of the republic of Mexico, is one of the most interesting cities of the Western world. Founded by the Aztecs more than a century and a half before Columbus started on his first voyage towards the Americas, it has grown from an Indian village of mud and rush huts to an imposing city of over 470,000 inhabitants. Its founders selected a site of unusual beauty. The city is built on a plateau lying on the west side of a great circular basin 2,220 square miles in area, on the rim of which rise lofty mountains and snow-capped volcanoes. The waters which through the past centuries have made their way down the mountain slopes into the valley have collected in shallow basins and formed six lakes which dot the surface of the plain.

Mexico City is 7,350 feet above the level of the sea, over 2,000 feet higher than Denver; it lies 263 miles west of Vera Cruz, on the Gulf of Mexico, and 290 miles northeast of Acapulco, on the Pacific coast. El Paso, Tex., a storm center of the border disturbances of the year 1916, is 1,224 miles to the northwest; Laredo, in the same state, and another frontier town, is about 840 miles directly north. Mexico City is connected by railroad with nearly all the Mexican state capitals and principal ports.

Streets and Buildings. For three centuries after the conquest of Mexico by Cortez, the country was under Spanish rule, and the capital city still has many features that suggest the great cities of the mother country. The dwelling houses, built of sandstone or lava, and but one or two stories in height, are rendered picturesque and charming by their terraced roofs and inner courts. Because of the frequency of earthquake shocks tall structures are not to be found in Mexico City, and the tallest office buildings rise no higher than five stories. Steel is used to a considerable extent in modern con-

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struction, and some of the older buildings lining the business streets present a curious contrast to the newer ones by reason of their leaning walls, rocked out of plumb by repeated shocks.

The city is laid out with regularity, and the streets in the newer districts are paved with stone and asphalt and lighted with gas or electricity. A visitor strolling down San Francisco Avenue, the main business thoroughfare, might well fancy himself in some fashionable quarter of an up-to-date Spanish city. Here are located the finest shops, hotels, restaurants, business offices and clubs. The most aristocratic street of the city, and the center of its social life, is the Paseo de la Reforma, a magnificent boulevard lined with handsome residences and fine trees.

Of the many squares and open spaces, the Alameda, or public gardens, covering an area of forty acres, and the Plaza Mayor are of special interest. The latter, a plot of fourteen acres, beautified by trees, flowers, marble fountains and statuary, is surrounded by a great Roman Catholic cathedral, the National Palace, the municipal buildings and some of the largest retail stores. On this square are held the patriotic celebrations, military concerts and various outdoor spectacles in which the Mexican people take great delight.

The cathedral, built on the site of an ancient Aztec temple, is one of the largest and most elaborate churches in North America. There are in the city about sixty other Roman Catholic churches, and a number of Protestant

THE CATHEDRAL

houses of worship. The offices of the President of Mexico, the Senate Chamber, the War and Finance departments and the national Treasury are located in the National Palace, while the city government offices are housed in the Municipal Palace, which faces the cathedral. North of the National Palace is the National Museum, containing, among other important collections, a group of Aztec relics of priceless value. Notable among the city's modern buildings are the Legislative Palace, built at a cost of 10,000,000 pesos (in normal times about $5,000,000), the central post office, costing nearly $2,000,000, and the finely-equipped national penitentiary, located on the eastern border of the city. Of special interest among the older buildings are the National Picture Gallery, the National Library, containing over 200,000 volumes, the Hospital Jesus Nazerino, established by Cortez in 1524, and a small building in which was done the first printing in America. See AZTEC; CORTEZ.

Education and Industries. The educational interests of the city are well provided for. The Mexican government maintains the University of Mexico, which, as reorganized in 1910, is at the head of the educational system of the republic. Under government control also are a large number of primary and secondary schools, an excellent college-preparatory school, technical, professional, normal and industrial schools. There are in addition about 200 private schools.

Industrially, Mexico City has developed notably within recent years, largely because of the development of electric power. There are at the present time over 150 manufacturing establishments in the city, producing linen, cotton and silk fabrics, leather, boots and shoes, liquor, flour, tobacco goods, furniture, pianos, matches, glass, soap and other commodities. Trade interests are chiefly in the hands of French, German and English merchants. There are fifteen public markets and several highly-capitalized banks.

Health Conditions. Though the climate of Mexico City is moderate and healthful, the city long bore an unfavorable reputation as to health conditions. Its annual death rate was formerly forty to every 1,000 inhabitants. This was due to inadequate sewerage and drainage systems, a soil polluted by the refuse of several centuries, and unwholesome living conditions in the poorer districts. In 1900 the government completed a magnificent sewerage and drainage system, and the death rate has since then greatly decreased. Epidemic outbreaks among the ignorant and poorer classes, however, are still a source of danger.

History. About 1325 the Aztecs, looking for a place on which to build a city, saw an eagle on a cactus devouring a snake. Interpreting this as a favorable omen, they settled on the site of the present city and called the place

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Tenochtitlan, meaning *cactus on a stone*. Later the name Mexico was chosen, as a mark of honor to their god of war, Mexitli. When the Spaniards reached the city, in 1519, it contained 50,000 buildings and was ten miles in circumference. The army of Cortez practically destroyed it, and it was rebuilt by native workmen under the direction of the conqueror. In 1600 it had about 15,000 inhabitants, in 1800 about 120,000, and in 1910 the population was 471,066.

Mexico City was the objective point of the American troops during the Mexican War of 1846-1848, and was captured by them in 1847 (see MEXICAN WAR; CHAPULTEPEC, BATTLE OF). During the revolutionary disturbances following the abdication of Porfirio Diaz (which see) the capital city played an all-important rôle, for the contending factions all sought to gain possession of it. It was occupied in turn by Carranza, Zapata and Villa, and was the headquarters of Carranza when, in June, 1916, he issued a note to the United States demanding the withdrawal of American troops from Mexican soil, which they had occupied in pursuit of bandits. For details, see the article MEXICO, subtitle *Government and History*.

Consult Enoch's *Mexico;* Percival's *Mexico City*.

MEYERBEER, *mi'er bayr,* GIACOMA (1791-1864), a German composer whose best opera, *Les Huguenots,* still enjoys the popular favor which was meted out to it upon its first performance in 1836. Meyerbeer, first known as JAKOB MEYER BEER, was born at Berlin, of a wealthy and talented Jewish family. At the age of seven he played in public one of Mozart's concertos, and had he followed his talent in this direction he would have ranked among the foremost pianists. But he was ambitious to become a famous composer, and the failure of his first two operas, *Jephthah's Vow* and *Abimelek*, did not dishearten him. He went to Italy to study vocal composition, and at Venice was so captivated by the style of Rossini that he produced a series of seven highly-successful Italian operas. A few years later he composed his first French opera, *Robert le Diable,* and his masterpiece, *Les Huguenots.*

After his appointment by the king of Prussia as his music director in Berlin, Meyerbeer composed his two other great works, *Le Prophete* and *L'Africaine (The Prophet* and *The African),* and the comic opera, *Dinorah.* Through his efforts Wagner, who was then languishing in poverty and exile, was able to obtain a hearing in Berlin, and with Jenny Lind as prima donna and Meyerbeer as conductor Wagner's *Rienzi* and *The Flying Dutchman* scored brilliantly.

Critics disagree as to the relative merits of Meyerbeer as a composer. Some maintain that he labored more zealously for theatrical effect than for artistic merit; however, it is generally agreed that, although he adopted widely different styles of composition, he mastered the best effects of the various schools and utilized them to brilliant advantage.

MEZZO-RILIEVO, *med'zo re lya vo,* a form of relief sculpture (see RELIEF) in which the figures project one-half their thickness from the background. The term means *semirelief.* Though the figures in mezzo-rilievo are rounded, no parts are separate from the surface upon which they are carved. This form of sculpture is higher than bas-relief (which see) and lower than high-relief (see ALTO-RILIEVO).

MEZZOTINT, *med'zo tint,* or *mez'o tint,* meaning *middle tint,* is a process of engraving on copper or steel, in imitation of painting in India ink, the lights and shadows being scraped and burnished out of a prepared dark ground. Mezzotint does not involve the labor entailed by line engraving, in which the lines are plowed into the copper. Because of the range of tone in mezzotint, it is admirably adapted to depicting the various textures in a portrait or the planes of a landscape, but it is not a suitable form of engraving where small detail is demanded. Lieutenant-General Ludvig von Siegen, in 1642, invented the mezzotint. Later he explained the process to Prince Rupert, who introduced it into England. It was brought into use in North America in 1830, and was long a favorite with early magazine publishers. See ENGRAVING; ETCHING.

MIAM'I, FLA., the county seat of Dade County, in the southeastern part of the state, is a noted winter resort and one of the principal shipping points on the Southern Atlantic coast. The city has developed since 1896, when the location was chosen as the southern terminus of the Florida East Coast Railway, a line later extended to Key West, 156 miles southwest, over the ocean. Miami is 366 miles south of Jacksonville, and is on Biscayne Bay, at the mouth of the Miami River, which is the outlet of one of the large canals draining the Everglades. Since the improvement of Miami harbor, the city has direct steamboat communication with Havana, Cuba; San Juan, Porto Rico, and Nassau, in the Bahama Islands.

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Various steamship lines connect with Atlantic ports.

Miami is known as the "Magic City," because of its rapid growth. The population in 1910 was 5,471, but the city in 1916 claimed over 15,000. It has a number of handsome hotels, a Federal building erected in 1914 at a cost of $225,000, a courthouse, city hall and a Y. M. C. A. building. Here is the southern terminus of the Dixie Highway (which see), and in and about the city are Bay Boulevard, Royal Palm, Lawrence and Biscayne drives. Interesting features of the city are the two-and-a-half mile bridge across the bay, an alligator farm, a large paint factory, a moving-picture studio and the subtropical laboratory of the United States government.

The city ships quantities of fish and sponges taken from Biscayne Bay, and oranges, grapefruit, cocoanuts, pineapples, avocados and limes, and winter vegetables. The value of the annual fruit and vegetable crop of Dade and Palm Beach counties exceeds $3,500,000. Miami is the trading center of the Seminole Indians, who live in and near the Everglades, northwest of the city. J.S.

MICA, *mi' kah,* sometimes incorrectly called *isinglass,* is the mineral whose most common use is observed in the doors of stoves. Mica is easily recognized because of the glassy appearance of its crystals, and because they can be separated into very thin plates. It is found surrounded by other rocks. There are several varieties, but white mica, or *muscovite,* is the one most widely used. When taken from the mine it is freed from the other rock and then split into layers of the desired thickness. Some of these layers for the most delicate purposes are thinner than tissue paper. The plates are cut with shears into different sizes; all those of one size are wrapped in packages, usually of one pound each, for the market. The waste from making the plates is ground to a powder, which is used for lubricating machinery when oil cannot be applied, for absorbing nitroglycerine in making dynamite, and for producing the "frost" effect on wall paper. The plates are also used for insulators in dynamo-electric machines.

Black or dark-green mica is known as *biotite.* Mica is quarried in large quantities at Grafton, N. H.

MICA SCHIST, *shist,* the rock which imparts to the White Mountains the snow-capped appearance from which they take their name, but which is abundant in nearly all mountain regions. It is composed of mica and quartz and is usually formed in layers which are folded. The mica may be white or black. Its arrangement in layers allows the rock to be easily divided into slabs. The peculiar whiteness of the White Mountains is caused by the reflection of light from this rock. It is of no value as a building stone, but may be used in rough foundation walls.

MICHAEL, *mi' ka el* or *mi' kel,* SAINT, one of the seven spiritual beings called the *archangels,* referred to in the Bible. Michael appears as one of the four great angels with Gabriel. In *Revelation* XII, 9, he is represented as a military commander in the heavenly war against Satan. The feast of Saint Michael occurs on September 29 in the Roman Catholic Church, while the Greek Church dedicates November 9 to this festival. See MICHAELMAS.

MICHAELMAS, *mi' kel mas,* a Christian festival held in honor of Saint Michael, the Archangel, and All Angels, celebrated on September 29 by the Roman Catholic, the Anglican and some other churches. The yearly celebration appears to have arisen out of a local church dedication in honor of Saint Michael in Italy in the fifth century, and by the ninth century it had become a day of considerable importance. The Greek, Armenian and Coptic churches dedicate November 9 to the feast of Saint Michael and All Angels.

MICHELANGELO BUONARROTI, *mi kel an' je lo bwaw nahr raw' te* (1475-1564), one of the greatest figures in the world of art, the most celebrated artist of the High Renaissance (see RENAISSANCE). Not only was he supreme as a sculptor and painter, but he was a poet, architect and military engineer as well —and he put the stamp of genius upon everything he touched. He was happiest when working with his chisel, for he displayed greatest power in sculpture. However, he was frequently called away from revealing the wonderful art concealed in the rough blocks of stone "in their superfluous shell" to execute some other masterpiece with his brush.

MICHELANGELO

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A tablet in one of the rooms of a castle ruin at Caprese, in Tuscany, Italy, indicates that this mountain town was the birthplace of Michelangelo. He was a member of the ancient family of the Counts of Canossa, and studied drawing under Ghirlandajo and sculpture under Bertoldo, at Florence. Later Lorenzo de' Medici, the celebrated patron of art, became attracted to Michelangelo, and the young sculptor was permitted many privileges as a member of his household.

When twenty-four years of age he executed a wonderful statue of the dead Christ in the arms of His mother, the *Pieta* of Saint Peter's Church. Then followed *David,* a masterpiece in sculpture eighteen feet high and so heavy that it took forty men to roll it from the workshop to the great central square in Florence. There it remained until 1874, when it was transferred to the Academy, where it still stands in glory and majesty. To aid him in this work Michelangelo constructed a tower around the immense block of stone and worked inside, quite undisturbed.

His *Moses* is the chief surviving figure of a magnificent tomb which was to have been placed in Saint Peter's in honor of Pope Julius II. Had he been able to carry out his ideas this would have been the most stupendous monument of sculpture in the world. So enthusiastic was he over the plans that he spent eight months at the Carrara marble quarries selecting suitable blocks. For forty years this tomb occupied his thoughts, but because of the Pope's superstitious fears about its completion the work was retarded. Only the *Moses,* now in the little Church of San Pietro in Rome, and the *Bound Captives,* in the Louvre, represent the accomplishments of Michelangelo's dream; and in the fiery expression which he chiseled in the face of his *Moses* one can read his own keen disappointment. (See MOSES, for illustration.)

However, Pope Julius II had another great assignment for him. This time it was to be a creation from his brush, the painting of the frescoes for the ceiling of his Sistine Chapel, in the Vatican. Michelangelo drew inspiration for these colossal paintings from Bible stories—the early stages of creation intermingled with historical scenes from the principal events in sacred history. In all there are 343 figures, of which more than 200 are important. Nothing in the history of painting excels the boldness and grandeur of this decoration in its entirety. Much of the painting had to be done while he was lying flat on his back on a staging of his own design. He was forced to look up so constantly that for many years after the ceiling was completed he could read only with his head thrown back. Michelangelo's next great work

HOME OF MICHELANGELO IN FLORENCE

was the execution of statues for the tombs of the Medici family in San Lorenzo, their Florentine church. The one known as *Il Penseroso,* from the pensive attitude of his subject, is counted among this genius's masterpieces.

When sixty years old Michelangelo was again summoned to Rome to paint the altar for the Sistine Chapel. This painting, *The Last Judgment,* his largest and most comprehensive canvas, is crowded with hundreds of figures; and although time has cracked the plaster and dimmed the coloring, it is still counted among the world's greatest paintings. Toward the end of his life he turned to architecture. He was appointed architect for the rebuilding of Saint Peter's; for this labor he would accept no pay, saying that he was doing all for the glory of God. He lived only to see the completion of the splendid gilded dome, but so faultless was his model for the building that his plans were perfectly carried out.

Michelangelo died at the age of eighty-nine, and was buried in the Church of Santa Croce

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beside the scholars and statesmen of Italy's glorious days. The three figures on his tomb, representing sculpture, painting and architecture, disclose to posterity the story of his creative genius. R.D.M.

Consult Hurll's *Michelangelo;* Stearn's *Midsummer of Italian Art.*

MICHELET, *me shlay',* JULES (1798-1874), a French historian of the Romantic School. He was born in Paris and was the son of a master printer. At the age of twenty-three he was appointed professor of history in the Collège Rollin. While a lecturer in the Collège de France in 1838, he became involved in a bitter controversy over the unpopular order of the Jesuits, and in 1851 refused to take the oath of allegiance to Napoleon III. Through this act he lost his offices and incurred the enmity of the Church. He lived mainly in Brittany and on the Riviera, where he devoted himself wholly to literature. Michelet's style appealed to emotion rather than reason, and he was rarely a calm judge of events. In 1867 he finished the great work of his life, *The History of France,* in nineteen volumes. Other published works include *La Femme, Le Banquet,* and several volumes of natural philosophy.

JULES MICHELET

MICHELSON, *mi'kel son,* ALBERT ABRAHAM (1852-), an American physicist, born in Strelno, Germany, whose parents emigrated to the United States when he was a child. His reputation rests largely upon his series of investigations in the velocity of light, his measurements being characterized by a high degree of accuracy. The inferential refractometer, invented by him, made possible the measurement of linear distances in terms of the wave-length of light. He also devised a spectroscope which enabled him to secure a better dispersion of light than with the prism (see LIGHT). He was graduated at the Naval Academy, Annapolis, in 1873, and took graduate courses in physics in Berlin, Heidelberg, the College of France and the Polytechnic School, Paris. He was appointed professor of physics in the Case School of Applied Science, in Cleveland, Ohio, and later held the same position in Clark University. In 1892 he was appointed as the head of the physics department in the University of Chicago. For his discoveries in physics, he was awarded the Nobel prize in 1907. Among his notable publications is a work entitled *Light Waves and Their Uses.*

MICHIGAN, *mish'i gan,* one of the north-central states of the American Union, named after the lake which forms much of its western boundary. The word is of Indian origin and probably means *great lake* or *great water.*

Michigan is sometimes called the PENINSULAR STATE because it is divided by lakes Michigan and Huron into two peninsulas, the upper and the lower. It is popularly known as the WOLVERINE STATE, and as its flower it has chosen the apple blossom. With great natural agricultural resources; timber and mines; well-developed and varied industries; splendid educational system; advanced political institutions, and early humane legislation, as embodied in its laws for the protection of the labor of women and children, Michigan is one of the most interesting states in the Union.

Size and Location. The northern peninsula of the state seems much the smaller section, yet from east to west its extreme length is 500 miles. The state is so surrounded by lakes Michigan, Huron and Erie that no point in the state is more than eighty-five miles from the shore of one of them. Its coast line is about 1,600 miles, being greater than that of any other state. Florida and California rank next

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to it, authorities differing as to which of these two has the longer.

Michigan is the largest state east of the Mississippi River except Georgia, and ranks twenty-second in size among the states of the Union. It covers about the same area as England and Wales together. It has an area of 57,980 square miles, of which 500 square miles are water; but this does not include the water area of the Great Lakes within the state boundaries. The distance in a straight line from Detroit in the southeastern part of the state to Isle Royale in Lake Superior is about the same as that from Detroit to New York. About 200 islands scattered in the Great Lakes are included in the state of Michigan; of these, Mackinac Island is one of the historic spots of the United States.

Its People. In population Michigan, with 2,801,173 inhabitants in 1910, ranked eighth among the states of the Union, coming between Missouri and Indiana. The estimated population January 1, 1917, was 3,074,560. It had in 1910 an average number of 48.9 persons to the square mile, and ranked seventeenth among the states in density of population. The southern half of the lower peninsula is the most thickly-populated section. Michigan has nearly 300,000 more inhabitants than the neighboring Canadian province of Ontario, which since 1912 has an area seven times as large. Of the total population in 1910, 43.6 per cent were whites of native parentage; 34.3 per cent were whites of foreign or mixed parentage; 21.2 per cent were foreign-born whites, and 0.6 per cent were negroes. Of the foreign-born white population, 28.7 per cent came from Canada; 22.1 per cent from Germany, 7.2 per cent from England, and about 5 per cent each from Russia, Holland, Austria and Sweden. The Canadian element is larger here than in any other state except Massachusetts.

During the decade from 1900 to 1910 there was a considerable increase in the proportion of the inhabitants living in towns. In 1910 the urban population constituted 47.2 per cent of the total population, as compared with 39.3 per cent in 1900. Over two-fifths of the urban population lived in the two cities of Detroit and Grand Rapids. There were 106 cities in the state in 1910; this unusual number is accounted for by the fact that no minimum population requirement is imposed upon villages which seek city charters; there is one city, Harrison, with only 600 inhabitants. Each of the most important cities is described elsewhere.

Religion. Half of the people of the state belong to the Roman Catholic Church, while nearly one-quarter belong in about equal numbers to the Methodist and the Lutheran churches. The rest of the population is divided

OUTLINE MAP OF MICHIGAN

Showing the boundaries of the state, the principal cities and rivers, mineral deposits, coal and gas areas and the highest point of land in the state.

largely among the Baptists, Presbyterians, Congregationalists and Protestant Episcopalians, in the order named.

Education. Michigan was a pioneer state in creating the American educational system, and has always been noted for the excellence of its public schools. It adopted a very good school organization at the time it was admitted to the Union, and this has been improved continuously by subsequent legislation. The state now possesses a good compulsory education law, with fairly effective means for its enforcement, voted in 1911. All children between the ages of seven and sixteen years are required to attend school the entire length of the school year. Special provision is made for the education of backward and feeble-minded children. The employment of children under fourteen years is prohibited, but children between fourteen and sixteen may be allowed to work if they have completed the eighth grade and have a permit from the school authorities. The public schools are maintained from the income derived from the state school lands, of which there are still large areas, also from the state funds and from local taxation.

The educational institutions are under the supervision of a state superintendent of public

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instruction, elected for two years, who must be a graduate of a university, college or normal school, and who must have taught five years in Michigan. The schools of each county are under the direct charge of a county school commissioner, elected for four years; each school district has its local board of education.

At the head of the educational institutions stands the University of Michigan at Ann Arbor (see MICHIGAN, UNIVERSITY OF), opened in 1841, and it is one of the largest and best known universities in the Union. The state maintains the agricultural college at Lansing, opened in 1857, the first agricultural college founded in the United States; and the college of mines at Houghton, opened in 1886. Among other colleges are Detroit College at Detroit, Hope College at Holland, Albion College, Alma College, Hillsdale College, Kalamazoo College and Olivet College; these are maintained by various religious denominations.

For the training of teachers there are four state normal schools, namely, at Ypsilanti, opened in 1852, the first normal school established west of New York; at Mount Pleasant, opened in 1895; at Marquette, opened in 1899; at Kalamazoo, opened in 1903. A marked feature of the Michigan system for the training of teachers is the county training school, which was established in 1903. These schools have already trained over 6,000 teachers. Michigan was among the first states to adopt the movement for teachers' summer institutes; the first in this state was held as early as 1846.

In 1907 the law authorized the establishment of county schools of agriculture. One or several adjoining counties may vote to establish such a school, to which the state is obliged to grant financial support. These schools teach agriculture, domestic science and manual training. Since 1908 numerous juvenile corn-growing associations which have as their object the scientific cultivation of corn have been founded among the schoolboys. Since 1911 fraternities and school societies have been abolished in all public schools.

The percentage of illiteracy is low, being 3.3 per cent of the total population in 1910; but if the native white population alone is considered it is only 1 per cent.

Physical Features. The upper peninsula has a rough, hilly or mountainous surface, and is a region of mining, lumbering, hunting and summer outings. The highest mountains in the state are the Porcupine Mountains, reaching an elevation of 2,000 to 2,100 feet above sea level, situated in the northwest, along the shores of Lake Superior. Parallel to the Porcupine Mountains is the famous Copper, or Mineral, Range. The lower peninsula is generally level and undulating, the highest land being around Saginaw Bay. The average altitude of this region is about 850 feet above sea level, or 270 feet above the level of lakes Michigan and Huron.

The lower peninsula is dotted with a large number of small, clear lakes, most of which are surrounded by forests and are noted for beauty and for an abundance of fish. It is estimated that there are more than 5,000 such lakes within the state; Oakland County alone has about 500. Along Lake Michigan there are numerous high bluffs and picturesque sand dunes.

Its Rivers. The rivers are short, small and shallow. The streams of the upper peninsula flow into Lake Superior, and many of them have beautiful waterfalls; these can be utilized for abundant water power. Among the chief streams are the Menominee, the Ontonagon, the Manistique, and the Escanaba, which flow into Lake Michigan. The largest streams of the lower peninsula are the Raisin and the Huron, flowing into Lake Erie; the Saginaw, the Au Sable, the Thunder Bay and the Cheboygan, flowing into Lake Huron; and the Grand, the Kalamazoo, the Saint Joseph, the Muskegon and the Manistee, flowing into Lake Michigan.

Climate. There is a marked difference between the climate of the lower peninsula and that of the upper peninsula, the mean annual temperature being 48° F. for the southern and 39° F. for the northern counties. The summers are cool and the winters are severe, usually with heavy snowfall. The presence of the lakes gives the lower peninsula milder winters and cooler summers than are experienced elsewhere in the same latitude. That portion of the state bordering on Lake Michigan, and extending as far north as Grand Traverse Bay, is influenced by the southwestern winds which prevail throughout the year. These winds tend to lengthen the cold season, and thus retard the early budding of fruit trees, prevent the appearance of late frosts and also prolong the warm season into the fall. Such conditions are especially favorable to the growing of fruit, and this region constitutes what is widely known as the Michigan fruit belt. The average rainfall in the state is about thirty inches, quite evenly distributed throughout the year.

Agriculture. Agriculture is the chief occupation of the people of Michigan and consti-

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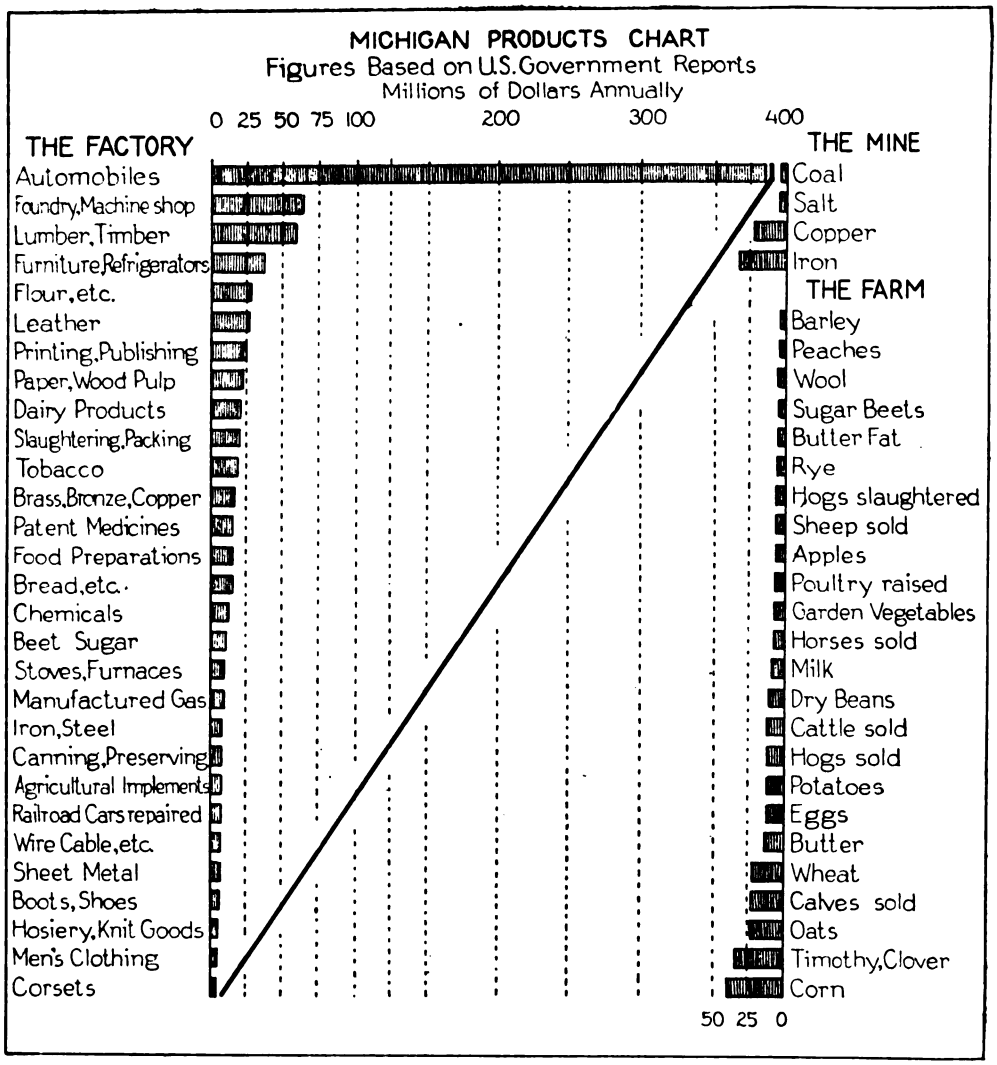

tutes the chief source of wealth of the state. Over one-half of its total land area, approximating 36,787,000 acres, was included in farms in 1910; and over two-thirds of this was improved land. The total value of farm property including land, buildings, implements and machinery, and live stock was $1,088,858,379, showing an increase in value of 57.7 per cent since 1900. The average size of a farm was 91.5 acres, and the average value of land was $32.48 per acre, as reported by the Federal census. One-third of the total farm acreage in the state was in farms of 100 to 174 acres, and a little under one-third was in farms between fifty and ninety-nine acres. Nearly eighty-five per cent of the farms were operated by owners or their managers, and only fifteen per cent by tenants. Seven out of every ten Michigan farmers are native whites, and nearly all the remainder are foreign-born whites; of the latter nearly two-fifths were born in Canada and over one-quarter in Germany.

The soil and climate make possible a variety of products. The leading crops are hay, corn, oats, wheat, rye, potatoes, sugar beets and market vegetables. The largest acreage is under hay and forage plants, but the crop of the greatest value is corn. Michigan ranks second in the production of potatoes, coming after New York. Michigan grows more potatoes than Illinois, Indiana and Ohio combined, its yearly output averaging forty-one million bush-

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els. The state ranks second in the production of rye, coming after Wisconsin; it ranks third in the production of buckwheat, following New York and Pennsylvania. On the drained swamp lands along the shores of lakes and rivers are many acres suitable for growing onions, cabbage, celery and other vegetables. Sugar beets is one of the leading crops; Michigan is third in beet production, coming after Colorado and California. The area under sugar beets is over 102,000 acres, and the product amounts to about 900,000 tons a year. Michigan raises nearly seventy per cent of the total production of beans in the United States, its output being nearly five million bushels. It also leads in the production of peas, with over 1,100,000 bushels a year, as well as in that of celery, chicory and peppermint. The state produces the bulk of the peppermint crop of the United States, in a small district in the southwest corner of the state; the largest peppermint farm in the world is in Allegan County.

As regards its climate and its soil, no state except California seems to be more favorably suited for the raising of fruit. The southwest corner of the state is generally known as the fruit belt, and here large quantities of apples, pears, peaches, plums and grapes are raised. Michigan is now the third state in the Union in apple growing, being surpassed only by New York and Pennsylvania; its yearly output is over seventeen and one-half million bushels. Over one and one-half million bushels of peaches and nearly one million bushels of pears are grown yearly. In small fruits, strawberries, blackberries and raspberries, Michigan ranks second among the states.

Forests. The region now included in the state was formerly covered with dense forests. The upper peninsula and the northern part of the lower peninsula are to-day quite heavily timbered, although lumbering operations have for years been on a very extensive scale. These primeval forests have long been among the most important sources of the wealth and prosperity of the state. In past years the cutting of the forests was done in a very wasteful way, but now scientific methods of forestry are followed, and there is a state commission for the better protection of the forests. It is estimated that nearly two-thirds of the total area of the state is still woodland. White pine was formerly the most abundant variety, but a great portion of the forests containing this timber has been cut. Hemlock forms now the greatest proportion of the softwood cut; other varieties are spruce, cedar and balsam fir. Maple, beech, birch, elm, and ash are the chief hardwoods. In 1914 the state ranked first in the cut of maple and beech. From 1870 to 1900 Michigan was the leading lumber state in the Union; it still ranks third, being surpassed only by Washington and Louisiana. The abundance of timber has been of great importance in developing other industries for which timber serves as raw material.

Fisheries. In the value of its fishing products Michigan ranks first among the Great Lakes states. Herring forms nearly one-third of the catch, while trout, whitefish and various pike perches are in the order named the other more important kinds of fish. It is estimated that the catch amounts to over fifty million pounds a year.

Live Stock. The raising of live stock and the dairying industry are growing steadily in importance. The value of live stock was nearly $185,000,000 on July 1, 1916. At that time there were in the state 814,000 milch cows, and 707,000 other cattle; 673,000 horses, 4,000 mules, 1,392,000 swine and 2,033,000 sheep. In the production of milk, butter, cheese and eggs the state ranks high. In the number of sheep and the clip of wool, which amounts to over 8,100,000 pounds of raw wool and over 4,050,000 pounds of scoured wool yearly, Michigan is only surpassed by Ohio among the states east of the Mississippi.

Minerals. Michigan ranks sixth among the states of the Union as regards the value of its mineral products, which averages over $72,000,000 a year. The great bulk of this wealth is furnished by copper and iron. Here are situated some of the most famous and the richest copper mines in the world—the Calumet and Hecla. Until 1887 it was the leading state in the production of copper, and even to-day it furnishes nearly one-quarter of the total output of the United States. With an average yearly production of over 230,000,000 pounds, Michigan now ranks third, following Arizona and Montana. The state has furnished nearly thirty per cent of the total output of copper in the United States since 1845. The copper mines are situated almost exclusively in the northwestern corner of the upper peninsula, known as the Keweenaw Peninsula, on the shores of Lake Superior.

The same region also contains very rich iron deposits; in fact, the Lake Superior region, extending in Michigan, Minnesota and Wisconsin, is the greatest iron ore region in the

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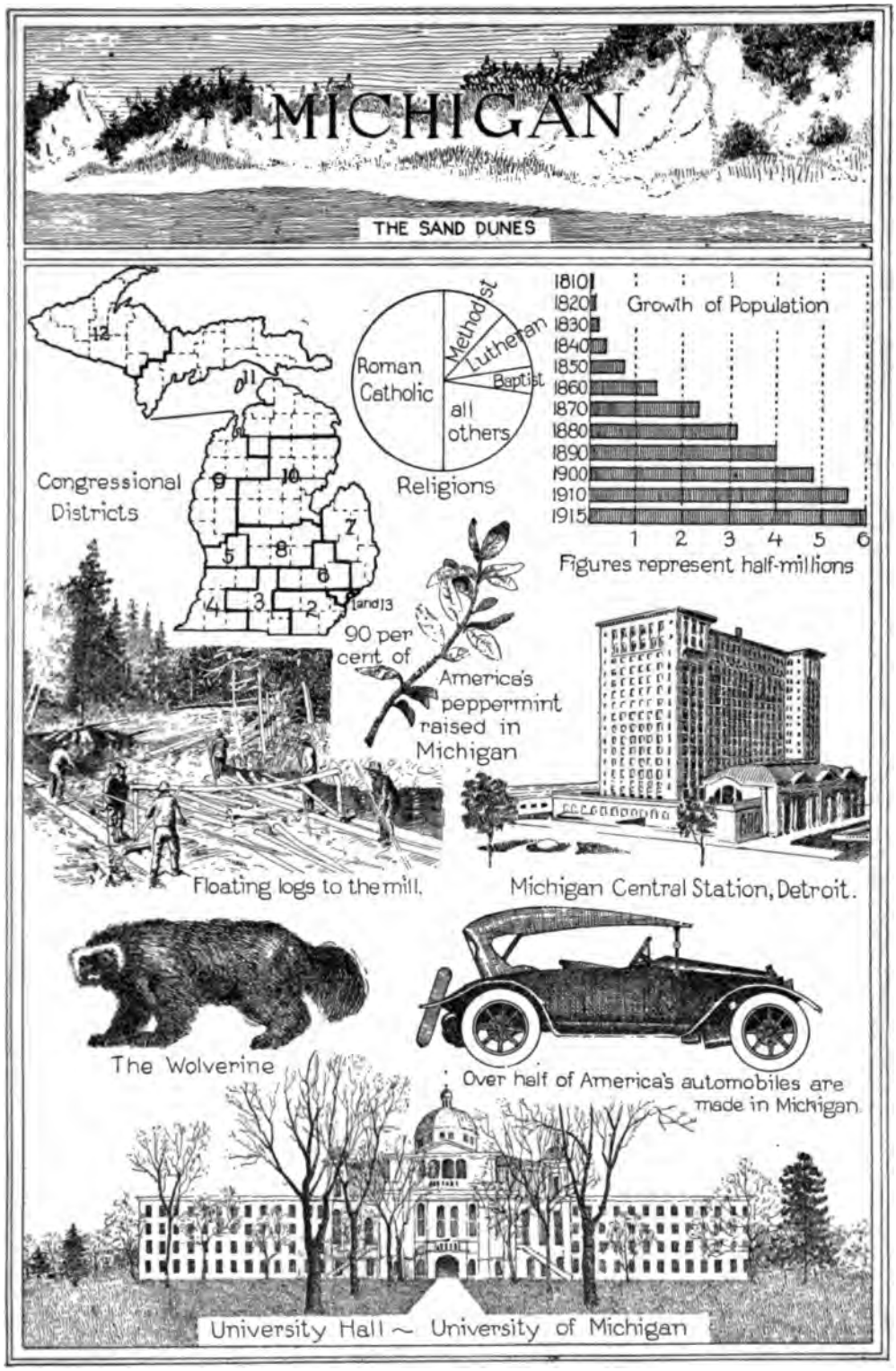

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world. Iron ores were first discovered at Ishpeming in 1844; the Marquette district, on the shores of Lake Superior, was opened in 1877; in 1882 mining began further south, in the Menominee district, and in 1884 in Gogebic County. Until the beginning of the twentieth century Michigan was the leading state in the Union in the production of iron ores, but since then it has been surpassed by Minnesota. The state produces about thirteen million tons of iron ore a year, which constitutes nearly one-third of the total output of the United States.

In the production of salt, Michigan ranks second, running New York very close for first place; it produces one-third of the total salt output of the United States. Large deposits of gypsum are found near Grand Rapids. The state ranks third in the production of alabaster, large deposits of this mineral being found near Tawas City. Numerous deposits of rock and marl beds, from which Portland cement is manufactured, are found throughout the state. Excellent clay for the manufacture of brick and tile and also suitable for pottery is found in many localities. During recent years coal has been mined, mostly around Saginaw and Bay City; the yearly output averages about 1,300,000 tons.

Mineral springs of generally accepted medicinal value are found in several parts of the state. The most famous are those at Mount Clemens; those at Benton Harbor and Alma are increasing in importance.

Manufactures. Michigan comes immediately after the six great manufacturing states in the Union, namely, New York, Pennsylvania, Illinois, Massachusetts, Ohio and New Jersey. It owes its manufacturing position to its situation on four of the Great Lakes and to its great agricultural, timber and mineral resources. The value of its manufactured products had risen to nearly $700,000,000 in 1915. One of the chief characteristics of industry in Michigan is that it is very much diversified, that is, it includes the manufacture of a great number of articles. No state manufactures a greater variety of objects or commodities more essential to modern civilization or comfort.

The most important single industry, as measured by the value of its products, is the automobile industry. The manufacture of automobiles in this state has shown a wonderful growth. Woodward Avenue in Detroit is fast becoming the greatest street in the world for the show and display of automobiles. Michigan manufactures more automobiles than any other state; its output in 1916 amounted to over half of the total value of the automobile industry in the United States. In the same year Michigan produced fifty-five per cent of the automobiles made in the United States, and a very large proportion of these were made in Detroit. Lansing and Flint are important centers of the industry, also. The next most important branch of industry is represented by lumber and timber products. These include the manufacture of furniture, in which Michigan ranks second, being slightly below New York. Grand Rapids is noted as one of the most important furniture centers of the world.

The state occupies a leading position in the manufacture of cereal and breakfast food preparations, which are produced chiefly at Battle Creek, and in the value of its output of stoves and furnaces, refrigerators, adding machines and druggists' preparations. Other important branches of industry are founding and the making of agricultural implements, flour and grist mill products, chemicals, cement, vehicles other than automobiles, such as carriages, wagons, railway and street cars; the manufacture of cigars and tobacco, slaughtering and meat packing, and tanning and the manufacture of leather. This last industry is favored by the great quantities of tanning bark found in the state.

Michigan ranks third in the production of beet sugar, coming after California and Colorado; its production averages nearly 115,000 tons of sugar a year. Shipbuilding is attaining large proportions, and is carried on mostly at Detroit, Port Huron and Wyandotte. Large quantities of paper- and wood-pulp products are manufactured here, the chief center of the industry being Kalamazoo. It is worth mentioning that nearly all the air guns with which the boys throughout the United States play are manufactured in Michigan.

Transportation. Situated between four of the Great Lakes, the state has excellent water transportation facilities, and many good harbors are found on its extensive coast line. The state is also well provided with railroads, for it is crossed by several trunk lines that connect the Eastern states with the Middle West, and which join with Canadian lines at Detroit and Port Huron. There were 8,933 miles of railroad in 1914. The chief lines are the Michigan Central; the Lake Shore & Michigan Southern; the Wabash; the Grand Trunk System of Canada; the Pere Marquette; the Chicago & North Western; the Chicago, Milwaukee &

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RESEARCH QUESTIONS ON MICHIGAN

(An Outline suitable for Michigan will be found with the article "State.")

What is the popular name for the state? What does this name mean?

About what is the difference in length between the coast line of Michigan and that of the states which rank next to it? What is the difference in character?

How can you tell whether the territory of Michigan was named for the lake, or the lake for the territory?

How many of the states have a greater area than Michigan? How many of these larger states lie to the east of this state?

How many states have a larger population? Are these more populous states all larger?

Is this state more or less densely populated than the United States as a whole? Than its neighbor states to the south and west?

Why has Michigan more cities than other states which have perhaps a greater population?

How does the state rank with reference to its interest in education?

In what way is the school system designed to benefit the farmers?

Are the greatest elevations in the state in the northern or the southern peninsula? How do the two peninsulas differ in surface character?

If the lakes of Michigan could be distributed among all the states, about how many would each have?

How great a difference is there between the average annual temperature for the lower peninsula and that for the upper?

Why is the region along Lake Michigan especially suited to fruit growing?

Of the total area of the state, about how large a percentage is actually improved farm land?

Name three products in which Michigan leads all the states; two in which it ranks second; three in which it ranks third.

About how large a proportion of the area of the state is under forests? What has been done to prevent deforestation?

How many states border on the Great Lakes? How many of these catch more fish in a year than does Michigan?

What two famous mines has this state? What is taken from them? How does the state rank in the output of this product?

Is there any other metal in which it ranks higher?

What mineral product of Michigan appears on your table at every meal?

How many states have a larger yearly value of manufactured articles? What is one of the chief characteristics of the manufacturing industries in Michigan?

What remarkable preëminence did Michigan's greatest city have in 1910 in the automobile-manufacturing industry?

What article that nearly every boy in the country asks for at Christmas time comes from Michigan?

What do you think of when the name of Grand Rapids is mentioned? Battle Creek?

What very important public utilities besides railroads does the state railroad commission have under its charge?

How many years has the state been governed under its present constitution? How many had it had previously?

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Saint Paul; the Minneapolis, Saint Paul & Sault Sainte Marie; the Duluth, South Shore & Atlantic; the Detroit & Mackinac; the Ann Arbor, and the Grand Rapids & Indiana. There is also a well-developed and extensive network of interurban electric lines. During recent years the state has started to improve its highways.

Michigan possesses a railroad commission, appointed by the governor, which has extensive powers. Since 1915 the express companies and the telephone lines have been classed as common carriers and have been put under its control.

Government. Michigan is governed under a new constitution adopted in 1908. This is the third the state has had since its admission to the Union in 1837. Amendments may be proposed in either branch of the legislature, and are adopted if they receive two-thirds of the vote in each house and are afterwards approved by a majority vote of the people. Since 1913 amendments may also be proposed by petition of not less than ten per cent of the qualified electors, filed with the secretary of state at least four months before election.

The executive officers, the governor, lieutenant-governor, secretary of state, treasurer, auditor-general, attorney-general and superintendent of public instruction, are each elected for two years. Among the offices created recently is that of state fire marshal, who receives his appointment from the governor.

The legislative power is vested in a senate, consisting of thirty-two members, and a house of representatives, consisting of not fewer than sixty-four and not more than 100 members. The members of both houses of the legislature are elected for two years and by single districts. Sessions are held every second year, beginning on the first Wednesday in January of odd-numbered years, and are not limited as to length. Michigan sends thirteen members to the United States house of representatives.

At the head of the judicial department is the supreme court, consisting of eight judges, elected for eight years. The members of the court are required to reside at the state capital, and the justice whose term expires first is chief justice during his last year of service. The state is divided into judicial districts and each has a circuit court, presided over by a judge elected for six years. Each county has a probate court, whose judge is elected for four years.

Towns and cities may adopt the commission form of government. The electors of cities and villages have power to make or amend their charters. Cities and villages may acquire, own and operate their public utilities.

Other Constitutional Provisions. Michigan has adopted a county local option law for dealing with the liquor traffic, and over one-fourth of the state is prohibition territory. Drinking of alcoholic liquors in trains, except in dining cars, is prohibited. Breweries may not own saloons, directly or indirectly. An employers' liability law, which does not apply to farm laborers and domestic servants, was adopted in 1912. Married women have a right to their personal earnings. Girls under eighteen are not allowed to work in a factory; children under sixteen are not allowed to work in a factory, workshop, mine or in messenger service between the hours of 6 P.M. and 6 A.M. The working hours of children under eighteen are limited to ten a day and fifty-four a week. An amendment to the constitution, adopted in 1913, provides that statute laws may be enacted by the initiative and referendum (which see). There is a primary election law for direct nomination of all elective state, county and municipal officers. In 1913 the state adopted the recall (which see) of all elective public officers except judges of the courts. In 1920 women in Michigan will for the first time cast their votes for electors of the President of the United States.

Charitable and Penal Institutions. The state maintains a school for the blind at Lansing; an employment institution for the blind at Saginaw; a school for the deaf at Flint; a school for feeble-minded and defective children at Lapeer, and a school for poor and dependent children at Coldwater, which was the first institution of its kind in the United States. The state prisons are at Jackson and Marquette; there is a house of correction at Detroit. The state reformatory for young men offenders is at Ionia; an industrial school for boys (reformatory) is at Lansing, and one for girls is at Adrian. The state maintains at Howell a sanatorium and farm colony for the care and treatment of epileptics. Hospitals for the insane are at Pontiac, Kalamazoo, Traverse City, Newberry and Ionia. As regards its penal legislation Michigan has adopted a probation law as well as a parole law and the indeterminate sentence.

History. *The Earliest Settlements.* French Jesuit missionaries and traders had visited Michigan as early as 1610, but the first permanent settlement was founded at Sault Sainte

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Marie by Father Marquette in 1668. Numerous villages were soon established, and Detroit was founded in 1701 by Cadillac. The territory made little progress under French occupation, and in 1763, at the close of the French and Indian War, it passed to the English by the Treaty of Paris. The Indians, loyal to the French, rose under Pontiac, massacred the garrison at Mackinac Island, then besieged Detroit for over five months, but without success. In 1774 the territory was annexed to Quebec, but by the Treaty of Paris in 1783, which closed the Revolutionary War, it passed to the United States. Thereafter for several years the Indians were restless, until they were finally subdued by General Wayne in 1795.

Made a Separate Territory. Michigan was made a part of the Northwest Territory, then for a time was a part of the territory of Ohio and of Indiana, but was made a separate territory in June, 1805, with William Hull as governor. It was the scene of important operations during the War of 1812. A dispute with Ohio concerning a strip of land along the southern boundary led to what was known as the "Toledo War" and delayed its admission as a state. Finally, on January 26, 1837, it was admitted as the twenty-sixth state of the Union.

Its Progress as a State. For a number of years the state was the victim of a spirit of speculation, which retarded its growth. The capital was removed from Detroit to Lansing in 1847. A new constitution was adopted in 1850, which remained in force until 1908. During the War of Secession Michigan contributed about 93,000 men to the Union armies. Since that time the chief issues in state politics have been the taxation and regulation of corporations. In national politics Michigan has always voted Republican, except in 1912, when it was Progressive, and in 1916, when it was Democratic. Many counties have been prohibition territory for years, but the voters in 1916 decreed that the entire state should be "dry" after 1918. O.B.

Consult Dilla's *The Politics of Michigan*; Cook's *Michigan, Its History and Government*; Skinner's *The Story of Michigan*.

Related Subjects. Much additional information will be found by the reader interested in Michigan in the following articles:

CITIES

Adrian
Alpena
Ann Arbor
Battle Creek
Bay City
Benton Harbor
Cadillac
Detroit
Escanaba
Flint
Grand Rapids
Hancock
Holland
Iron Mountain
Ironwood
Ishpeming
Jackson
Kalamazoo
Lansing
Laurium
Ludington
Manistee
Marquette
Menominee
Muskegon
Negaunee
Owosso
Pontiac
Port Huron
Saginaw
Sault Sainte Marie
Traverse City
Wyandotte
Ypsilanti

HISTORY

Cadillac, Antoine de la Mothe
Jesuits
Marquette, Jacques
Northwest Territory
Pontiac
Raisin River, Massacre of
War of 1812

LAKES

Great Lakes, The

LEADING PRODUCTS

Apple
Automobile
Bean
Breakfast Foods
Buckwheat
Copper
Corn
Fish
Furniture
Hay
Iron
Lumber
Pea
Peppermint
Potato
Rye
Salt
Sugar

MICHIGAN, LAKE, the third in size of the five Great Lakes of North America, and the largest body of fresh water lying entirely within the boundaries of the United States. It washes the shores of the state of Michigan on the east, of Indiana on the south, of Illinois and Wisconsin on the west and of Upper Michigan on the west and north. From north to south it has a length of about 300 miles. The average width is seventy-five miles, the average depth is 870 feet and the area is 22,450 square miles. Lake Michigan therefore covers almost the same space as New Hampshire, Massachusetts and Connecticut combined. Its surface is 581 feet above sea level, the same elevation as that of Lake Huron, and it is twenty-one feet below the surface of Lake Superior, eight feet above that of Lake Erie and 334 feet above that of Lake Ontario.

It receives the waters of the Saint Joseph, Kalamazoo, Grand, Menominee and other rivers, and discharges into Lake Huron through the Strait of Mackinac; hence it is a most important factor in that great waterway of Eastern North America which affords transportation to the Atlantic Ocean for the extensive products of the grain, lumber and mineral regions. It is also the outlet for large rail shipments to the South by way of Chicago, the fourth largest city in the world, on its southwestern shore.

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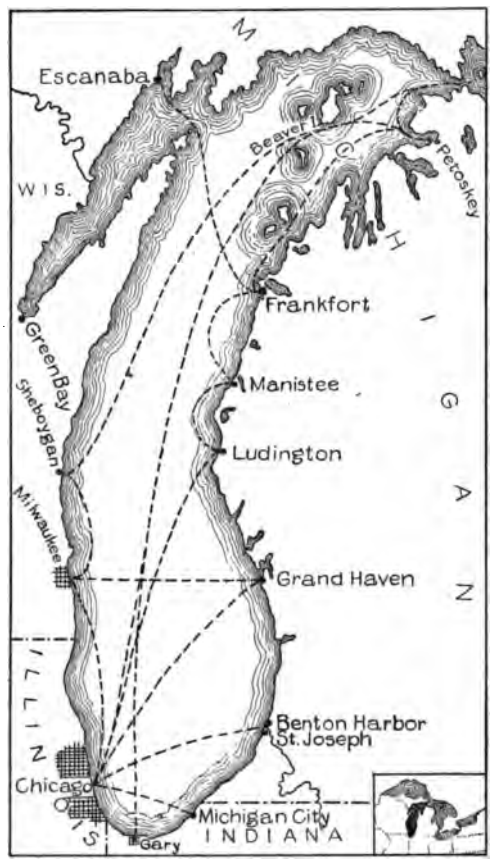
The Chicago Drainage Canal and the Illinois and Michigan Canal connect the lake with the Mississippi River. Navigation is suspended in the northern part of the lake for about four months of the year, owing to ice in the Strait of Mackinac, but during the warmer months transportation is heavy.

Many steamers ply on its waters between various resorts of the United States and Canada. Among the important towns and cities on its



LAKE MICHIGAN
Its cities and steamer routes.

shores are Petoskey, Manistee, Traverse City, Ludington, Muskegon, Grand Haven, Benton Harbor and Saint Joseph in Michigan; Michigan City and Gary in Indiana; Chicago, Evanston and Waukegan in Illinois; and Milwaukee, Sheboygan, Manitowoc and Marinette in Wisconsin. Its waters abound in fish, especially trout and whitefish. Green Bay is the largest indentation on the western coast, and Grand Traverse Bay and Little Traverse Bay are the largest on the eastern coast. The surface of the lake is varied in the north by many islands, the largest being Washington Island and Beaver Island. See GREAT LAKES, THE. J.S.C.

MICHIGAN, UNIVERSITY OF, one of the largest and most important of the American state universities and the first of these to assume and maintain a position of prominence. It was established by the legislature in 1837, at Ann Arbor, and began its formal sessions in 1841. The university maintains a college of literature, science and the arts, a college of engineering and architecture, schools of law and medicine, a college of pharmacy, a homeopathic medical school, a college of dental surgery and a graduate school. Courses have recently been established in forestry, in marine engineering, in highway and construction engineering, in aeronautics, in wireless telegraphy and in public health. The graduate school has been maintained separately from the other departments since 1912. Each of the university divisions has its particular faculty, and each is represented in the university senate, where questions of common interest are discussed.

The University of Michigan was one of the first American institutions to adopt coeducation, women having been admitted since the year 1870. Since 1871, when Dr. James B. Angell became its president, its development has been remarkable. It is equipped with libraries containing a total of about 350,000 volumes, and with valuable museums of art, science and history. It maintains an astronomical observatory. Two general hospitals, in addition to the state hospital for those who are mentally diseased, are operated in connection with the university. In debating, oratory, athletics and scholarship, Michigan takes high rank among American universities. Its faculty numbers about 460 and the student enrolment is 7,214. H.B.H.

MICHIGAN CITY, IND., an important shipping point and the oldest lake port of the state. It is situated in Laporte County and on Lake Michigan, near the northern state line, thirty-eight miles southeast of Chicago by water and fifty-six miles by rail. It is on the Pere Marquette, the Lake Erie & Western, the Chicago, Indianapolis & Louisville and Michigan Central railways; during the summer months excursion boats make daily trips to and from Chicago. Interurban lines connect with cities in the northern part of the state as far east as Elkhart and west to Chicago. The first permanent settlement was made in 1833, and the city was incorporated in 1837. In 1910 the population was 19,027; in 1916 it was 21,512 (Federal estimate). The area is six and one-fourth square miles.

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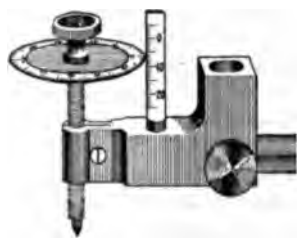
The growth of the commercial and industrial interests of Michigan City is due to its shipping facilities. Iron ore, salt, lumber and farm products are the chief articles of trade, and the manufacturing interests are represented by lumber mills and furniture, chair, hosiery and knit-goods factories. All of the railroads serving the city have big machine shops here. Michigan City has a United States life-saving station, the Northern Indiana state prison, a public library, a soldiers' monument and a large amusement park on the lake front. Of special interest to visitors are the great sand dunes which have been heaped upon the lake shore west of the city.

MICROMETER, *mi krom'e ter,* an instrument used in connection with a microscope or telescope for measuring very small distances. The name is derived from the Greek word *mikros,* meaning *small,* and *metron,* meaning *measure.* The simplest form of micrometer consists of a fine scale marked on a glass disk in hundredths of an inch to form squares; the observer is enabled to determine the size of the object by the number of squares covered. Surveyors' instruments have micrometers attached which measure distances by means of a screw with a very fine thread, and there are also special forms for the accurate measurement of V-threads on bolts and screws. Another special form is used to measure star distances on photographic plates.

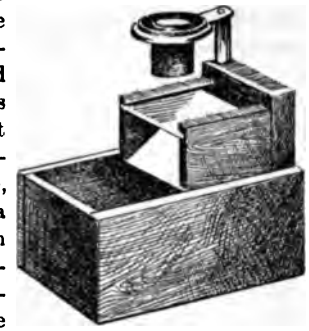


MICROMETER
Used by surveyors.

MICRONESIA, *mi kro ne'shi a,* a name applied to a division of Pacific islands lying between the Philippines on the west and the 180th meridian. The group is one of the four divisions of Oceania. For location and names of the islands of Micronesia see colored map accompanying the article OCEANIA.

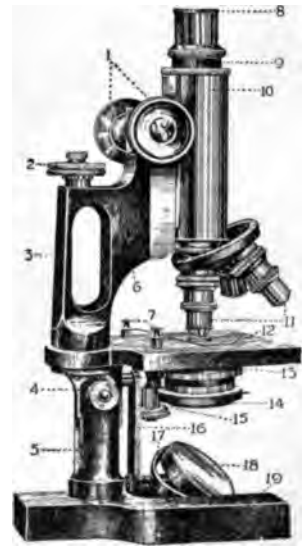
MICROSCOPE, *mi'kro skope,* from two Greek words, *mikros,* meaning *small,* and *skopein,* meaning *to view,* is the name applied to an instrument for magnifying small objects.

Simple Microscope. This is commonly called a *magnifying glass;* it consists of a stationary double-convex lens to be held between the object and the eye. It is very useful for examining flowers, insects, etc., and is a familiar object in the high school biological laboratory. The most powerful simple magnifiers have a magnifying power of twenty diameters; that is, they are capable of making the surface of an object examined appear 400 times larger than it really is. The average microscope, however, has a power of from five to ten diameters. The simple microscope has been in use for centuries. In the ruins of Nineveh was found a lens of rock crystal that had been used as a magnifier by the ancient Assyrians thousands of years ago.



A SIMPLE MICROSCOPE
With glass slide for objects.

Compound Microscope. This instrument has for its essential parts an object glass and an eyepiece. These are mounted in tubes so adjusted that the tube containing the eyepiece slides within the one which holds the object glass. The tubes are attached to a stand, the latter containing a platform for holding the object. Beneath the platform is a small convex mirror for reflecting light upon the object. A magnified image of the object is formed by the object glass, and a magnified image of this image is formed by the eyepiece. The apparent size of the object is increased or reduced in proportion as the



COMPOUND MICROSCOPE
(1) Coarse adjustment by rack and pinion
(2) Micrometer head of fine adjustment
(3) Fine adjustment pillar
(4) Inclination point
(5) Pillar
(6) Arm
(7) Clips
(8) Eyepiece
(9) Draw tube
(10) Body tube
(1) Object glasses
(2) Platform
(3) Upper iris diaphragm
(4) Lower iris diaphragm
(5) Focusing screw
(6) Mirror bar
(7) Mirror fork
(8) Mirror
(9) Horseshoe base

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lenses are farther apart or nearer together; thus the observer may increase the magnifying power of the instrument by extending the tube. Most compound microscopes have three object glasses and one eyepiece. A microscope having two tubes to be used with both eyes is called a *binocular*. For the various parts of a compound microscope see the accompanying illustration. The first instrument of this kind was made in 1590 by a Hollander named Zacharias Janssen; every generation has witnessed important improvements.

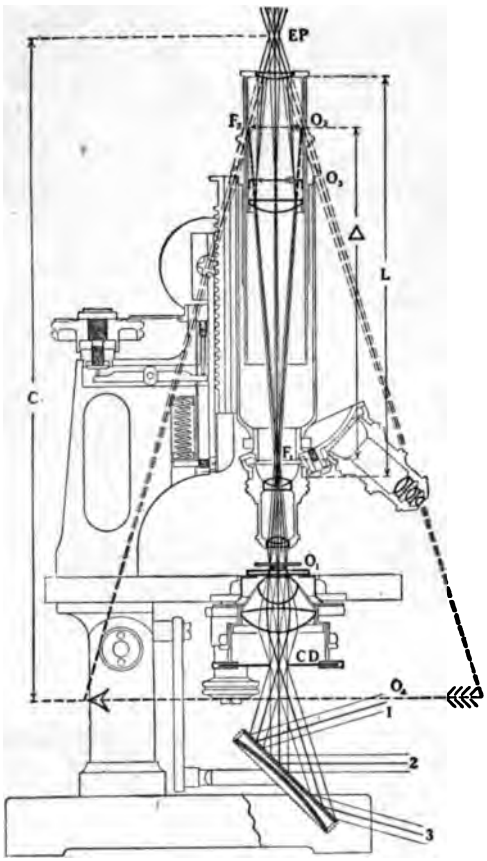

DIAGRAM SHOWING PATH OF LIGHT RAYS

F_1 Upper focal plane of objective
F_2 Lower focal plane of eyepiece
Δ Optical tube length = distance between F_1 and F_2
O_1 Object
O_2 Real image in F_2, transposed by the collective lens, to
O_3 Real image in eyepiece diaphragm
O_4 Virtual image formed at the projection distance C, 250 mm. from
EP Eyepoint
CD Condenser diaphragm
L Mechanical tube length (160 mm.)
1, 2, 3 Three pencils of parallel light coming from different points of a distant illuminant, for instance, a white cloud, which illuminate three different points of the object

Most objects can be easily seen under the microscope, but those which cannot need special treatment and are placed upon a glass mounting prepared for the purpose and covered with a thin glass which is cemented in place with Canada balsam. Specimens containing disease germs and those in which minute cell structures are to be shown must be spread on glass, dried, passed through a blue flame and stained with coal-tar or aniline dyes, as *fuchsine* or *methylene blue*, or with gentian violet.

Some Results of Microscopy. Many marvels of insect and plant life and hidden secrets of the mineral kingdom have been revealed to the scientist by means of the microscope; but more than this, the perfection of the instrument has revolutionized the science of medicine. A drop of blood may now be examined and so magnified that the physician can tell whether or not it contains any of those minute forms of animal life that mean disease. Bacteriology, the study of bacteria, could not have been pursued if man had never had a knowledge of the compound microscope, and the various disease germs, those that are responsible for malaria, typhoid fever, diphtheria, etc., could not have been detected. The microscope has, therefore, been a wonderful agent in destroying the power of disease and in making the world a more healthful place in which to live. C.R.M.

Consult Clark's *Practical Method in Microscopy*; Carpenter's *The Microscope*.

MIDAS, *mi'dahs,* a mythical king of Phrygia who had a wondrous garden into which Silenus loved to go. The king, by mixing some poison in a fountain, succeeded in capturing the old satyr, whom, after a time, he returned to Bacchus. Pleased at regaining his old tutor, Bacchus conferred upon Midas the power of turning to gold everything he touched. When this power proved a curse, by turning his food to gold, the king besought release from Bacchus and was told that if he bathed in the river Pactolus he would be freed.

Once Midas acted as judge between Apollo and Pan in a musical contest, and decided in favor of the latter. This so enraged Apollo that he caused a pair of ass's ears to grow upon the king's head. Midas tried to conceal the deformity, but a slave discovered it when dressing the ruler's hair. Afraid to tell, yet unable to keep the strange secret, the slave dug a hole in the earth and there whispered his funny tale. Later, reeds grew up over the spot, and whenever the wind blew over them they sang to all passers-by, "King Midas has ass's ears."

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MIDDLE AGES, a name given to the period between ancient and modern civilization. Many different dates are given for both the beginning and the end of this period. Some authorities assert that the Middle Ages began with the fall of Rome in A.D. 476; others that it began with the crowning of Charlemagne in 800, with the death of Charlemagne in 814, or with the fall of the Frankish Empire in 843. Most authorities agree on the fall of Rome in 476, and divide the time into the *Dark Ages,* when learning and civilization were temporarily obscured, and there was scarcely any progress, and the *Renaissance,* or *rebirth,* of knowledge, of arts and of industry.

There is almost as great divergence of opinion as to the close of the Middle Ages as there is as to the beginning. The end of the Reformation in Germany, the fall of Constantinople (1453), the discovery of America (1492), and the end of the Thirty Years' War by the Treaty of Westphalia (1648) are all advanced as the final boundaries, but the event most generally accepted as the date of transition is the discovery of America in 1492. See DARK AGES; RENAISSANCE.

MIDDLESBROUGH, *mid'd'lz bruh,* an English seaport near the mouth of the River Tees, in Yorkshire. It was founded in 1830 and grew slowly until 1852, when iron ore was found in the Eston Hills; thereafter the population increased at a remarkable rate. The town is well built, and has many public buildings of real architectural beauty, including a town hall and library, a Roman Catholic cathedral and a museum. Aside from its iron-manufacturing industries, the town is also noted for shipbuilding. There are large docks, a two-and-a-half mile breakwater and an excellent harbor. The tonnage of incoming and outgoing vessels per year is about 3,250,000, and the district produces annually over two million tons of pig iron. Population, 1911, 104,760.

MID'DLETON, SIR FREDERICK DOBSON (1825-1898), a British soldier, best remembered for his services in suppressing the Saskatchewan, or Riel, Rebellion in Canada in 1885. Sir Frederick was born at Belfast, Ireland. At the early age of seventeen he was graduated from the Royal Military College at Sandhurst, and thereafter was in active service in Australia, New Zealand and India. During the Indian Mutiny of 1857 and 1858 the Victoria Cross was given him for valor. From 1868 to 1870 he was in Canada with his regiment, and in 1884 returned to the Dominion as commander-in-chief of the militia. When the Saskatchewan Rebellion broke out General Middleton at once took charge of operations and himself commanded the right, which advanced from Qu'Appelle to Batoche and defeated the rebels in the Battle of Fish Creek. As his reward General Middleton received a grant of $20,000 from the Dominion Parliament and the honor of knighthood from Queen Victoria. He remained in Canada until 1890, when he returned to England. In 1896 he was appointed keeper of the crown jewels.

MIDDLETOWN, CONN., a county seat of Middlesex County, situated in the southwestern part of the state and on the west bank of the Connecticut River. Hartford, the state capital, is fourteen miles north. Transportation is provided by the New York, New Haven & Hartford Railway and by the river, which to this point is navigable for smaller vessels. Interurban lines radiate from the city in all directions. In 1910 the population was 11,851; in 1916 it was 13,273 (Federal estimate).

The region around Middletown is a rich agricultural country, especially adapted to the growth of tobacco. Through its water power and shipping facilities the city has become a manufacturing center of importance. Among the varied articles produced are pumps, marine hardware, woolen blankets, hammocks, rubber, bone, silk goods, electrical appliances and silver-plated ware. Valuable sandstone is quarried in Portland, a city on the opposite bank of the river, connected with Middletown by a long drawbridge. The municipal building, Middlesex Hospital and the Russell Free Library, containing 15,000 volumes, are the noteworthy buildings, and one mile southeast are the imposing buildings of the state hospital for the insane. Middletown has Wesleyan University, with a library of 60,000 volumes; Berkeley Divinity School (Protestant Episcopal), opened in 1854, and the state industrial school for girls.

Middletown was founded in 1650 and is one of the oldest cities in the state. In 1651 it was incorporated as the town of Mattabeseck, the present name being adopted in 1653; in 1784 it became a city.

MIDDLETOWN, N. Y., is a city in Orange County, in the southeastern part of the state, sixty-seven miles northwest of New York City. It is on the Erie, the New York, Ontario & Western and the Middletown & Unionville railroads, and has an interurban line to Goshen. The area of the city is four square miles. The population in 1910 was 15,313; in 1916 it was

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15,810 (Federal estimate). Middletown is well situated in a fertile agricultural country and contains several attractive parks, a Federal building, the State Homeopathic Hospital for the Insane, a state armory, city hall, Masonic Temple, Thrall Library and Thrall Hospital. In the town and vicinity are many summer residences. The city has shops of the New York, Ontario & Western Railroad, and manufactories of condensed milk, cheese, leather, saws, files, straw hats, shirts, candy, cut glass and printers' supplies. There was a settlement at Middletown in 1706. The name refers to its position halfway between the Hudson and Delaware rivers, on the old Minisink road to the western part of the state. It was incorporated as a village in 1848 and became a city in 1888. L.S.C.

MIDDLETOWN, Ohio, a city in Butler County, in the southwestern part of the state, thirty-four miles north of Cincinnati. It is on the Miami River and the Miami & Erie Canal and on the Cincinnati, Hamilton & Dayton, the Cincinnati Northern, the Cincinnati, Lebanon & Northern (a branch of the Pennsylvania lines), and the Cleveland, Cincinnati, Chicago & Saint Louis railroads. There is an electric interurban line from Cincinnati through Middletown to Dayton, twenty-two miles north. The population, which in 1910 was 13,152, was 15,625 in 1916 (Federal estimate). The area is two and a half square miles.

Wheat, dairy products and tobacco from the fertile Miami Valley are marketed in Middletown, and here are large manufactures of agricultural implements, paper, tobacco, steel, steel sheets, iron, motorcycles, paper machinery and gas engines. The city has a Federal building, Carnegie Library and public hospital. Middletown, which received its name from its central position between Cincinnati and Dayton, was settled in 1794 and incorporated in 1833. The commission form of government was adopted in 1913. The waterworks are owned by the municipality.

MIDLAND, a town in Simcoe County, Ontario, on an arm of Georgian Bay called Hogs Bay. It is on the Grand Trunk Railway, 102 miles north of Toronto by the shortest route, 116 miles northwest of Peterborough and thirty-three miles northwest of Orillia. Steamers connect Midland with Parry Sound and other ports on Georgian Bay. Population in 1911, 4,663.

Midland is an important manufacturing center. Its largest establishments are lumber and planing mills and sash-and-door factories, but a shell factory, woolen mill, flour mill, engine works and blast furnace are worthy of mention. Midland also has a shipbuilding yard, and has considerable trade in coal and grain. Hydroelectric power is obtained from the Severn River.

MIDSUMMER NIGHT'S DREAM, a comedy by Shakespeare, played in 1595 and published five years later. Suggestions of various parts of the plot are to be found in old sources, but the general plan was largely original with the author. Fairies, monsters, peasants, nobles, mingle in the action, which at no time is to be taken seriously. Though probably intended as a pageant, this play is much more fitted to be read than to be acted, for the imaginative charm is difficult of presentation on the stage. The "Pyramus and Thisbe" interlude is one of the most humorous things in all of Shakespeare's works. (See Drama, page 1855, for suggestions for dramatization and for illustrations.)

All brilliant flowers are pale and dead
And sadly droop to earth,
While pansies chill in velvet robes
Count life but little worth;
But in these dark November days
That wander wild and wet,
Our thoughts are winged to summer hours
On breath of mignonette.
—Pierson: *Mignonette.*

MIGNONETTE, *min yun et',* a widely cultivated garden favorite with modestly colored flowers of delicate, pleasing fragrance. It is a plentiful weed in Africa and Asia Minor, whence

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it was carried to Europe and America. The name was given it in France and means *little darling*. From a low, bushy mass of smooth, soft green leaves, the mignonette sends inconspicuous spikes of bloom. The tiny flowers of green and white fringe, brightened only by reddish anthers within, would attract no attention were it not for their delightful fragrance. Through cultivation many improvements have been made in the size and color of the flower spikes.

The mignonette thrives best in a cool temperature and a rather light soil. It is hardy, and a succession of seed plantings will furnish a continuous supply of blooms. Seeds sown in July will insure flowers in November, a fact dwelt upon by Eliza O. Pierson in her poem, *Mignonette*.

MIGRA'TION OF ANIMALS. See ANIMAL, subtitle *Migration of Animals*.

MIGRATION OF BIRDS. See BIRD, subtitle *Migration of Birds*.

MIKADO, *mi kah'doh,* a word meaning *exalted gate,* is the official title of the emperor of Japan. It is heard more outside of Japan, however, than in that country, where he is preferably called *Tenshi-Sama,* "Son of Heaven," *Mikado* being reserved for poetry. The imperial line dates back to 660 B.C. and descent is claimed from the gods, that created all things. The mikadoship is therefore the longest continued office in existence. The person of the mikado is held in the most sacred veneration, for he is regarded by the Japanese as the foundation of all wisdom and the center of their history and government. Each mikado has a title by which he is known to history after death. Yoshihito, who ascended the throne in 1912, is the 133rd of the line of mikados, seven of whom were women. This unique title is more familiarly known throughout the west than almost any other title, through *The Mikado,* the popular light opera of Gilbert and Sullivan, which is a travesty on the office.

MILAN, *mil'an,* or *mi lan',* in Italian MILANO, *me lahn'o,* set in the midst of fertile Lombardy in one of the most picturesque parts of Italy, is the second largest of Italian cities, being surpassed in size only by Naples. For centuries a great commercial center, it has become the chief financial and banking city in Northern Italy. Milan is surrounded on three sides by walls, and is entered by fourteen gates, some of them of great magnificence. It has suffered too much from the ravages of war to give the visitor an impression of its antiquity, for from the havoc wrought a busy, enterprising city has sprung up. Its royal and archiepiscopal palaces are of regal splendor. On the walls of the refectory of the church of Santa Maria delle Grazie, built in 1462, is Leonardo da Vinci's *Last Supper*. Of still greater fame is the magnificent Gothic cathedral, one of the largest churches in the world (see below).

The principal secular building is the Brera Palace, formerly a Jesuit college, now the palace of fine arts and sciences, containing paintings by Raphael, Luini, Bellini, Titian and many other masters. The Ambrosian Library contains 164,000 volumes and 8,100 manuscripts, in addition to a fine collection of drawings and pictures. Milan possesses a famous Conservatory of Music, and its opera house is the second largest in Italy. The city carries on a prosperous trade in grain, cheese, butter, eggs and poultry, and has varied and important manufactures, including silk, machinery, automobiles, furniture and glassware. It is, in addition, the center of the Italian book trade.

Milan's authentic history began about 222 B.C., when it was wrested from the Gauls by the Romans. In the twelfth century it was the strongest of the city republics, and two centuries later was made a duchy for the family of Visconti, who gradually became supreme over almost all of Lombardy. On the extinction of the Sforza dynasty, Charles V united Milan with Spain. In the early eighteenth century it was ceded to Austria, and later was made the capital of the Napoleonic kingdom of Italy. In 1815 it was restored to Austria and continued to be the capital of the Austro-Italian kingdom until the annexation of Lombardy to Piedmont in 1859, when it became a part of United Italy (see ITALY, subtitle *History*). Population of city and suburbs, 1911, 599,200.

Milan Cathedral, a world-famous Gothic masterpiece, is situated in the chief open square in the center of the life of the city, and ranks next to Saint Peter's at Rome and the cathedral at Seville, Spain, so is the third largest and finest church in Europe. Its foundation was laid by Gian Galeazzo Visconti in 1386; and it was completed by order of Napoleon I in 1805-1813. A canal was built solely for the purpose of conveying marble from the quarries of Ticina for its construction. The Milanese were determined to make it their building of buildings, and during the centuries some of the greatest architects of Europe helped to perfect their ideals. The cathedral is built of white Carrara marble, in the form of a cross, with a length of

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486 feet and a breadth of 287 feet. The tower, from which a beautiful view of the distant Alps and the picturesque environs is obtained, is 356 feet high. The exterior is adorned with about 6,000 statues in niches, and there are hundreds of turrets and pinnacles. The windows present wonderful stories pictured in stained glass. Some of the great men who have contributed to Milan's greatness are buried in the cathedral, and there in 1805 Napoleon, amid great pomp, was crowned king of Italy. R.D.M.

Consult Noyes' *Story of Milan;* Ady's *History of Milan.*

MILAN DECREE, *de krec',* an important document issued by Napoleon Bonaparte in 1807 during his struggle for supremacy in Europe. Realizing that his desire to invade England was impracticable, he planned the financial ruin of the country by shutting off its trade with the continent of Europe. England had already closed all seaports from the Elbe River to the end of the French coast, and in 1806 Napoleon retaliated by issuing the Berlin Decree, blockading the British Isles and making all English ships subject to seizure. This he followed, in 1807, by the Milan Decree, declaring that a ship of any nationality which had touched at British ports would be regarded a hostile vessel and a prize of war, if captured. But English warships still controlled the ocean. English vessel men demanded large sums for running the French blockade, and trade was nearly destroyed. Accordingly the Continent was impoverished, other powers were antagonized, and Russia, in 1810, diplomatically abandoned its policy of coöperating with Napoleon. With his fall, in 1814-1815, the Continental System (which see) came to an end.

MILDEW, *mil'du,* a name applied to a variety of plant disorders and also to the molds and rusts that collect on food, clothing, furniture, etc. There are two classes of plant mildew, the *powdery* and the *downy.* Powdery mildews, which usually form flourlike blotches of white on the surface of the host, attack flowers, fruits, stems and leaves of various plants by means of tiny sucking organs, stunting the growth of the diseased portion or killing it. This form of mildew can often be checked if the plants are dusted with dry sulphur, or exposed to fumes of boiling sulphur. Downy mildews develop within the plant, appearing on the surface when they shed their summer spores, and producing the familiar downy, whitish appearance. Since this disease develops within the plant it cannot be combated so easily as the powdery mildew, and consequently causes serious damage to vegetation. Spraying with Bordeaux mixture is, however, a helpful remedy. The mildews on furniture, clothing, walls, etc., represent other species. See RUSTS; MOLD; INSECTICIDES AND FUNGICIDES.

MILE, a unit of distance which originated with the Romans, and which has been adopted, with slightly varying values, by Western countries. England's statute mile, used in Great Britain and the United States and their possessions, is 320 rods or 5,280 feet long. The square mile in these countries contains 640 acres. The geographical, or nautical, mile is one-sixtieth of a degree of latitude, or about 6,080 feet. The knot, by which the rate of a vessel's motion is measured, is equivalent to one nautical mile. Below is a table comparing the miles of other countries with the English mile:

English Statute Mile	1.000
English Geographical Mile	1.150
French Kilometer	0.621
German Geographical Mile	4.610
Russian Verst	0.663
Austrian Mile	4.714
Dutch Ure	3.458
Norwegian Mile	7.021
Swedish Mile	6.644
Danish Mile	4.682
Swiss Stunde	2.987

MILES, NELSON APPLETON (1839-), an American soldier who distinguished himself in many of the most important battles of the War of Secession and later as an Indian fighter on the frontier of what was then the West. He was born in Westminster, Mass., and was early in life a clerk in a mercantile house in Boston, but at the outbreak of the war in 1861 he entered the service of the Twenty-second Massachusetts regiment. In 1862 he was promoted to the rank of colonel and passed rapidly through all the grades, being brevetted brigadier-general in 1864. After the war he joined the regular army and during the next fifteen years was known for his aggressive campaigns against hostile Indians in the West. In 1886 he captured the troublesome Geronimo, chief

NELSON A. MILES
America's most distinguished general of the past generation.

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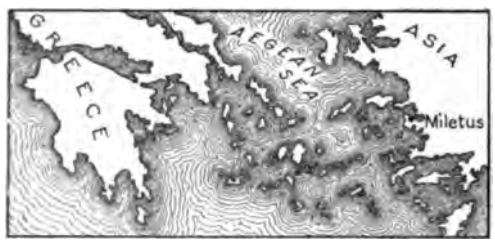
of the Apaches, and in 1890 settled the Dakota Indian troubles. He succeeded to the command of the regular army in 1895, and during the war with Spain, in 1898, conducted the campaign in Porto Rico with ability. On August 8, 1903, having reached the age limit, he was retired from active service. His published works include *Personal Recollections, Military Europe, Serving the Republic* and *Observations Abroad.*

MILETUS, *mile'tus,* an ancient city of Ionia, Asia Minor, at the mouth of the Maeander River, once famous as a trading center and for its manufactures of woolen goods. Boats and camel trains exchanged their cargoes at its



LOCATION OF MILETUS

wharves. It was the birthplace of important Greek thinkers and writers and the home of a great school of philosophy. Paul visited Miletus shortly before his imprisonment at Rome. The ancient city was destroyed by the Persians in 494 B.C. but was rebuilt. Near the site of the old city, which has been excavated by German archaeologists, is the small Turkish village of Palatia.

MIL'FORD, MASS., a city in Worcester County, thirty-two miles southwest of Boston and eighteen miles southeast of Worcester. It is on the Charles River and on the New York, New Haven & Hartford and the Boston & Albany railroads. The population in 1910 was 13,055; in 1916 it was 14,110 (Federal estimate). The area exceeds thirteen square miles. Milford is noted for its granite quarries, from which stone is shipped to every part of the United States, and for manufactures of looms for cotton machinery, foundry and machine-shop products, bone cutters, rubber and straw goods and shoes. The city has a Federal building, constructed of Milford granite, a public library, a hospital and several parks. A settlement was made here in 1669; the place was a part of Mendon until incorporated as a separate town in 1780. W.L.C.

MIL'ITARY ACAD'EMY, UNITED STATES, a national institution established by Congress at West Point, N. Y., in 1802, for the purpose of educating officers for service in the United States army. Earl Kitchener, the War Minister of Great Britain during the great European war from 1914 to June, 1916, and the most experienced British commander, after a visit to West Point in 1913 expressed the wish that the military schools and colleges of England could be modeled absolutely on the plan adopted at West Point, which he described as the finest military school in the world. Apart from the efficiency of the training given, West Point differs greatly from the military colleges of England in that it is possible for candidates to graduate without expense to themselves or families, while the English colleges are open only to sons of wealthy or well-to-do parents. Each accepted nominee to West Point is paid $600 per year by the government and a daily ration fee of thirty cents, which makes his total income $709.50 per year; he is able and is expected properly to maintain his position on that sum, and is prohibited from receiving money from home or from friends.

ARMS OF THE ACADEMY

The present era of the history of West Point began in 1817, under the direction of Major Sylvanus Thayer of the Corps of Engineers, when an adequate body of teachers was authorized, age and mental requisites for admission prescribed and the maximum number of candidates or cadets was fixed at 250. Under later acts that number has been greatly increased.

Number of Cadets. Each Congressional district and territory, including Porto Rico, is entitled to two cadets at the Academy. The District of Columbia is entitled to four. Each state is also apportioned four cadets from the state at large, and eighty are admitted from the United States at large, twenty of whom shall have been recommended as honor graduates of educational institutions having officers of the regular army detailed as professors of military science and tactics, and which institutions are designated as "honor schools" as a result of an annual inspection by the War Department. The President is also authorized to appoint cadets to West Point from among enlisted men of the regular army and National Guard, provided that the total number shall

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not exceed 180 at any one time. The appointment from each Congressional district is made upon the recommendation of the United States Representative from that district, and the two from the state at large are named by the Senators from that state. The eighty appointments from the United States at large are controlled by the President personally. The cadets from the District of Columbia are nominated by the commissioners of the District and the two from Porto Rico by the governor of that territory. The Philippine Islands send four cadets, appointed by the governor-general. Appointments are made one year in advance of vacancies, and each appointment is made from the district in which the vacancy occurs.

The appointments at the command of the President of the United States are usually distributed among the sons of officers of the United States army, who, from the nature of their fathers' services and changing residences, are unable to obtain nominations from members of Congress. Nominees must be between the ages of seventeen and twenty-two, fit physically for military service, and be able to pass careful examinations in English grammar, composition, literature, algebra, geometry, geography (especially the United States), United States history and general history.

Course of Instruction. The course of instruction extends over a period of four years and is principally mathematical and professional and very thorough, necessitating the acquirement of a broad and comprehensive education. Mathematics, English, French, Spanish, drawing, drill regulations of all arms of the service, natural and experimental philosophy, chemistry, mineralogy, engineering, art and science of war, ordnance and gunnery are the chief subjects taught. That the examinations are severe is proved by the fact that only one-half of those admitted as cadets succeed in passing the final examinations.

Rules and Regulations. The discipline of the Academy is strict, even more severe than that of the army, and punishments, by loss of marks, are inflicted for breach of regulations. This course is inflexibly adhered to in order to impress upon the cadets the value of implicit obedience and punctuality. During his course of four years a cadet has to be present at about 18,000 roll calls, about fifteen each day, for classroom work, drills, etc. If late, a mark against him is the result, and if a cadet receives 215 demerit marks in any twelve months for all offenses combined, he is discharged. A high standard of honor and truthfulness is inculcated and maintained among the cadets, and the services rendered to the country by graduates of West Point are a striking tribute to the rules and regulations. During his entire course a cadet is allowed only one leave of absence, at the completion of two years at the Academy.

Examinations are held in December and June, and according to the results of these, cadets are promoted in their classes or discharged. On completion of the course and passing a final examination cadets are commissioned in the regular army with rank of second lieutenant. The superintendent is an army officer who has associated with him about eighty instructors, also army officers. The instructors in military science and tactics are changed every four years, being detailed by the Secretary of War.

From 1802 to 1913, inclusive, the Academy graduated into the United States army 5,205 cadets, and owing to the excellence of the training received, the United States has army officers equal in military, mental and social accomplishments to those of any country in the world. Cadets of the United States Military Academy wear a uniform of gray, the service coat being a sack coat without buttons, trimmed with black braid, the dress coat being a swallow-tailed coat with brass buttons. Rank or standing of cadets is indicated by chevrons or bars on the sleeve.

The Academy is beautifully situated, overlooking the Hudson River a few miles north of New York. In 1903 Congress appropriated $5,500,000 for new buildings and for remodeling the old structures, thus giving the institution an equipment among the finest in the world.

Service to the Nation. Nearly every military commander the country has produced since the organization of the Academy was educated there. There are a few notable exceptions, such as William Henry Harrison, Zachary Taylor, Andrew Jackson and Winfield Scott. The great leaders of the North and South, both on the side of the Federal government and of the Confederate States, were graduates of West Point. Notable among these are Grant, Lee, "Stonewall" Jackson, Early, McClellan, Beauregard and Sherman.

Of the soldiers whose reputations have been made since the War of Secession, there are few who did not receive their education at West Point. Possibly the most notable exceptions are General Chaffee, who rose from the rank of private to become lieutenant-general of the army; Nelson A. Miles, who rose to the same

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exalted rank; Leonard Wood, who entered military life in 1886 as assistant-surgeon in the United States army, and whose ability raised him to the rank of major-general in 1903 and later to the post of chief-of-staff; and Frederick Funston, who entered the Cuban insurgent army in 1896 as captain of artillery, and who attained the rank of major-general in the United States army in 1914. L.R.G.

For description of the school which trains for the navy, see NAVAL ACADEMY, UNITED STATES.

Consult Holden's *West Point and the United States Military Academy*; Hancock's *Life at West Point*.

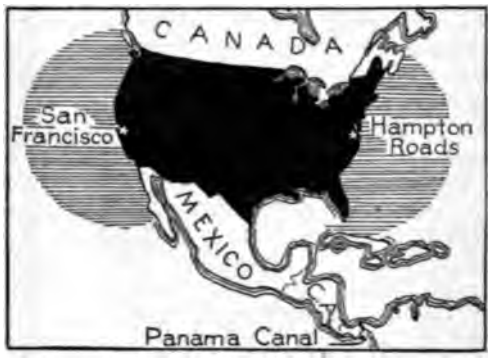
MILITARY PREPAREDNESS is the practical application of the old adage "In time of peace prepare for war." Every nation maintains a standing army, and any nation that has a seacoast maintains a navy. But military preparedness means more than maintaining an army and a navy, as the War of the Nations fully demonstrated. In the words of General Leonard A. Wood, chief-of-staff of the United States army, preparedness means:

> The organization of all the resources of the nation—men, material, money—so that the full power of the nation may be promptly applied and continued at maximum strength for a considerable period of time.
>
> Back of the machine itself is the railroad service so organized as to be turned over immediately to the military authorities. Back of this come the civil hospitals, the batteries and the supply departments of all sorts, each with its responsibility fixed in case of operations within its area, or in case of a demand for supplies in other sections of the theater of war. The plans of every ship are known, and plans completed for her use as a troop ship, and when war threatens, the whereabouts of the shipping is closely watched, and ships are assembled quietly to meet any demand which may be required for oversea operations.

Military Systems. Two systems of providing a standing army have been maintained for a long time; they are the *volunteer* system and the *compulsory* system or *conscription*.

The Volunteer System. Countries in which the volunteer system has existed have a strong objection to maintaining a large standing army in times of peace. Great Britain and her colonies and the United States are the leading countries that have relied upon the volunteer system. In both these countries the size of the army is fixed by legislative enactment, by Parliament in Great [illegible]ritain and by Congress in the United States.

Under the volu[illegible]n join the army of their ow[illegible] for a definite term. When the time for which they enrolled has expired the men are discharged or are given the privilege of reënlisting. Every applicant undergoes a rigid physical examination, and only those who come up to the required standard are accepted. In the United States the term of enlistment was fixed by the army law of 1916 at seven years, three years with the colors and four years in the reserve. In Great Britain the term of enlistment in the regulars is twelve years, seven years with the colors and five in the reserve. These requirements apply in the time of peace. The emergency created by the War of the Nations caused them to be set aside. Canada maintains no regular standing army, but for service in the War of the Nations nearly 500,000 volunteers joined the colors.



FIRST DEFENSE AGAINST A FOE

The navy of the United States is the first line of defense against a foe from overseas. The above map indicates by the shaded areas the steaming radius of the navy in thirty to thirty-five hours, by which it could intercept and give battle to invading forces.

The Compulsory System. Under the compulsory system all men who are physically and mentally sound are required, when they reach the prescribed age, to enter the military or naval service. The term of service varies in different countries. In Germany each man must serve two or three years in the standing army, and the balance of the term of seven years in the reserve. In France, the requirement is three years in the active army, eleven in the reserve and seven in the territorial army, which is another branch of the reserve.

All European countries except Great Britain, Japan and the leading countries of South America have for years relied upon the compulsory system for military and naval defense, and under this system the Great Powers of Continental Europe have brought their armies and navies to a high state of perfection.

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Voluntary or Compulsory Service. There has always been a difference of opinion among statesmen as to the relative advantages and disadvantages of these systems. Those who advocate the volunteer system claim that, except in case of the country's extreme peril, men should not be required to bear arms against their will; that compulsory service tends towards militarism, which is contrary to the principles of a democracy; and that the personnel of an army obtained by this system is of a higher order than that of an army obtained by compulsory service.

Those favoring the compulsory system claim that the voluntary system always fails in times of emergency; that it places the burden of defense upon a few when it should be borne equally by all male citizens of suitable age; that the fear of militarism is unwarranted by the history of the countries maintaining the compulsory system. The advocates of the compulsory system point to the military weakness of Great Britain at the outbreak of the War of the Nations in 1914, and to the condition of the military forces of the United States when they were called to mobilize on the Mexican border in 1916, and to the further fact that before Great Britain was able to secure an adequate army it was obliged to resort to conscription.

Conscription in the United States. During the War of Secession the Federal government was forced to resort to conscription, but the term of service ended at the close of the war. With the entry of the country into the War of the Nations in 1917 the government was confronted with the question of providing a large army in the shortest possible time, and the questions of voluntary and compulsory service were thoroughly discussed in Congress and throughout the country. While the voluntary system had many eminent advocates, the pressing need for an army turned the balance in favor of compulsory service, and in May a conscription law passed both Houses of Congress. The law provides:

1. That all civilian male citizens between the ages of twenty-one and thirty shall be registered for military service.
2. That the first draft of 500,000 shall be selective, occupation to determine exemptions.
3. That the total draft may call 1,000,000 men to the colors.
4. That each state shall supply its quota in such proportion as the population of such state bears to the population of the United States.
5. That no substitutes shall be allowed. If a man is drafted he must serve.
6. That the regular army shall be increased to 293,000 and the National Guard to 330,000.
7. That the total armed forces of the United States may be increased to 1,900,000 men.
8. That the pay of enlisted men be raised from $15 a month to $30 a month.

The exempted classes include the Vice-President, legislative, executive and judicial officers of the United States and of the several states; members of religious organizations whose creeds oppose warfare, and ministers. Provisional exemptions may be made by the President.

Military Instruction in Schools. State universities and other educational institutions may organize courses of military instruction, and upon approval of these courses by the Secretary of War they may have officers of the regular army appointed as instructors; military training is required in most state universities. It has also been instituted in numerous other schools of college grade, and has recently been extended to the high schools. This last work was instituted by Captain Edgar Z. Steever in the high school of Cheyenne, Wyo., in 1911, and it has been adopted by a number of other cities. The work is entirely voluntary and of such nature as to be physically beneficial to the boys. Those who advocate this line of training maintain that it is better than ordinary athletics.

Some object to military training in the schools on the ground that it will foster a warlike spirit which in time may give the country a large number of men inclined to lead the nation into war, and also on the ground that such training is contrary to the spirit and purpose of the public school system, and that boards of education have no right to use the school funds for such a purpose. W.F.R.

Related Subjects. The reader is referred to the following articles in these volumes:

Army	Navy
Conscription	War
League to Enforce Peace	War of the Nations

MILITARY SCHOOLS, academies and colleges where training in military science is added to the regular course of study. In the United States, in addition to the national academy at West Point, there are a number of boys' schools that offer military training. The students usually wear uniforms, learn how to drill and become in some degree acquainted with the strategy and tactics of war. There is also training in gymnastic and other body-building exercises. It is believed that the military organization and morale tend to promote in the

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students desirable habits of self-reliance and willingness to obey orders.

All important civilized nations maintain such schools to drill their officers. The academy at West Point (see MILITARY ACADEMY, UNITED STATES) is one of the best-equipped schools in the world. The academic training is equivalent to that offered in other American colleges, the engineering course being especially fine. There the officers of the United States army receive their preliminary training in the profession of arms. Germany, Great Britain, Austria and France all have famous military schools, which have been maintained for a long time. The greatest French soldier, Napoleon Bonaparte, founded the celebrated school of Saint-Cyr in 1803. In Germany picked officers receive their higher training at the school at Berlin, founded by Frederick the Great. England trains its young officers at the Royal Military College at Sandhurst and at the artillery and engineering school at Woolwich. The chief Canadian institution is the Royal Military College of Canada, established in 1886 at Kingston, Ontario. A certain number of its graduates receive commissions in the British service. See ARMY.

MILITIA, *mi lish'a,* a term variously used, but meaning, in general, a body of armed citizens. In the British service the militia is the reserve force, or *second line.* In the United States, by militia is meant all able-bodied male citizens and all other able-bodied males who have declared their intention of becoming citizens, who are not under eighteen or over forty-five years of age. Certain Federal and state officials, workmen in armories, arsenals, etc., and members of certain religious sects are excepted. The militia is subdivided into the national guard, the naval militia and the unorganized militia, the latter consisting of the great body of unenlisted citizens.

The National Guard. This defensive arm is composed of the organized militia of the several states. The Hay-Chamberlain army reorganization bill, approved by President Wilson in June, 1916, provided for 800 enlisted men in the National Guard for each Senator and Representative in Congress, and a number to be determined by the President for each territory and the District of Columbia. Under this law, organizations of the militia cannot disband without the consent of the President, nor can their commissioned or enlisted strength be reduced below the minimum prescribed by the President without his consent.

The period of enlistment is now six years, the first three in the active organization, the second three in the National Guard Reserve. The qualifications for enlistment are the same as in the regular army. In time of war one reserve battalion for each regiment of infantry or cavalry and for each nine batteries of field artillery or each twelve companies of coast artillery may be brought into the service of the United States. This makes it possible for the President to draft about 800,000 militia without calling for volunteers.

The law also requires a minimum of forty-eight times each year for assembly for drills and instruction, including indoor target practice, with instruction of not less than one and one-half hours' duration for each such period; the character of the instruction is to be prescribed by the Secretary of War. In addition, the militia organizations are to participate in encampments, maneuvers, or other exercises, including outdoor target practice, at least fifteen days in each year, unless excused by the Secretary of War.

Captains and higher grades receive $500 per year, first lieutenants $240 per year, second lieutenants $200 per year. Enlisted men are to receive twenty-five per cent of the initial pay of the regular army of the same grade, provided that the militiamen have attended not less than the forty-eight drills per year; and a proportionate amount of such pay if they have attended not less than twenty-four drills in the year. L.R.G.

Obligations to Militia Service. The Constitution of the United States declares that "The President shall be commander-in-chief of the . . . militia of the several States when called into the service of the United States," thus assuming that the several states would possess and make use of the power to demand of their citizens military service. The country, and under the country the state, gives to every citizen protection in any lawful enterprise he may undertake, and if such an enterprise is of public benefit, the government usually stands ready to furnish assistance as well as protection. In return the country has a right to expect that every citizen will, when it is necessary, be ready to defend its institutions and safeguard its borders.

Related Subjects. The reader is referred to the following articles in these volumes:

Army	Landwehr
Conscription	Military Preparedness
Landsturm	War, Department of

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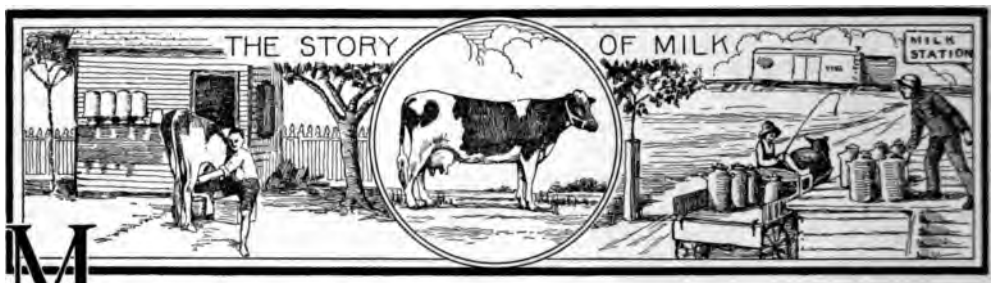
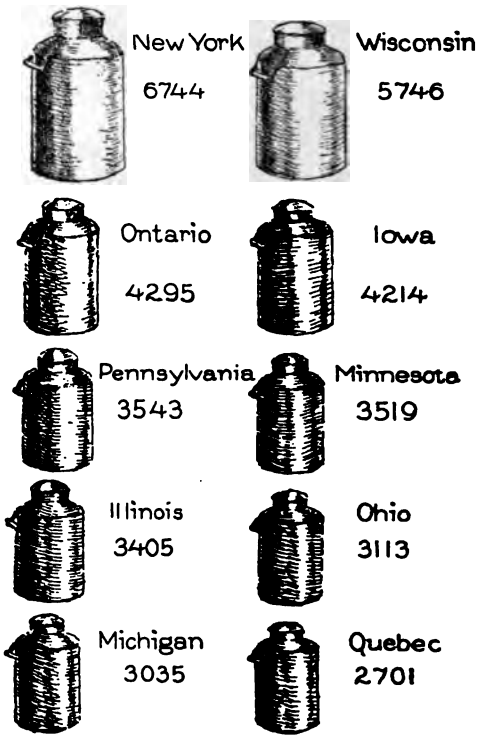


MILK, a fluid secreted by the female of all mammals for nourishing their young. The milk of domesticated animals, including cows, goats, sheep, asses and horses, has been used from the earliest recorded time as food for man. The milk of the cow, however, is the only one now in general use in the United States and Canada.

Cow's milk is of chief commercial interest and is also typical of all milks. It is an opaque, whitish fluid, sometimes slightly yellowish or bluish. Its specific gravity averages about 1.032; that is, it is about three one-hundredths heavier than water; a gallon of milk weighs 8.6 pounds. It requires five and one-half gallons of good milk to produce a gallon of cream, three and one-half gallons to make a pound of butter, and about one and one-third gallons to make a pound of cheese. Chemically considered, milk is an emulsion (which see) of globules of fat in a water-solution of casein, milk sugar, albumin and ash. The water usually comprises 87.2 per cent of milk; the fat is about 3.7 per cent; casein, 3 per cent; milk sugar, 4.9 per cent; ash and albumin, each less than 1 per cent. The milk from different animals varies considerably in its composition, as does also the milk from the same cow at different times. The percentages given are merely approximate standards.

When examined under a microscope the tiny globules of fat can be seen. They vary greatly in size, from one fifteen-hundredth to one twenty-five-thousandth of an inch in diameter, but it has been estimated that on an average they are so small that one million of them are contained in a pint. If milk is allowed to stand in a cool place, these globules will gradually rise to the surface and form *cream*. It is from the cream that butter, which is about 85 per cent fat, is made. Milk from which the cream has been removed is called skim or skimmed milk.

The richness of milk—that is, the percentage of fat, casein and other solids—has been increased by careful breeding and care of cows for centuries. The milk of wild cattle is not nearly so rich as that of domestic varieties. It is not true, on the other hand, that the proportion of milk fat can be permanently increased by feeding; so long as the food is ample and wholesome it seems to have no



Figures Represent Millions of Pounds

PRODUCTION IN A YEAR

effect on the quality of the milk. It has been noted, however, that there seems to be a direct transmission of certain volatile-oil constituents of feed to the milk, for example, when cows eat garlic and onions; and everybody is familiar with the change in flavor which occurs when the cows are first let out to green pasture in the spring.

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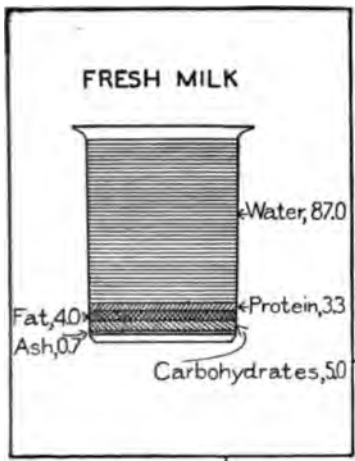

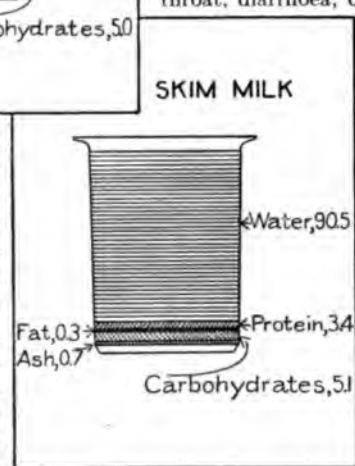

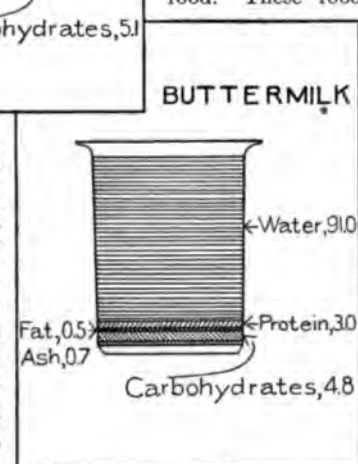

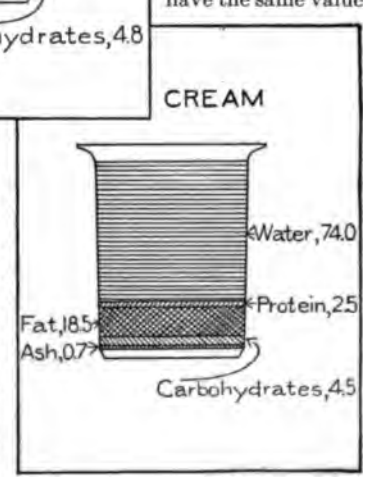

Care of Milk. Milk is extremely sensitive to outside influences, and its flavor and freshness are easily destroyed by the proximity to disagreeable odors. It readily absorbs odors from the stable, or from meats and vegetables in ice boxes. The care and handling of cows is discussed elsewhere, and it is only necessary here to mention certain general principles about handling milk. When freshly drawn it should be placed in closed vessels, and should be removed at once to a clean, dry room. It should be strained through a metal gauze and a flannel cloth, and should then be cooled to a temperature of 45° F., if it is to be shipped immediately, or to 60° F., if it is to be used at home or taken to a creamery. Fresh, warm milk should never be mixed with milk already cooled.

In the Home. Milk in the home should always be kept on ice, if possible, and in covered or closed vessels. All cow's milk, even when handled most carefully, contains germs, and when carelessly handled, or in warm weather, the number of them is enormous. While most of these are harmless, or cause nothing worse than the souring of the milk, occasionally there are others present which may produce scarlet fever, typhoid fever, tuberculosis and other serious diseases. Under ordinary circumstances the milk which is delivered by dairy companies is pure, but under certain conditions it should be sterilized or pasteurized, especially if it is to be used by children, whose digestion and general health are more easily affected than those of adults. *Sterilizing* milk means heating it to a temperature of 212° F. (the boiling point) for an hour; in *pasteurizing*, the milk is not boiled, but is heated only to 155° F. or 160° F. for half an hour. Pasteurizing will kill the germs of the diseases mentioned above. But pasteurized milk will not keep indefinitely, and it should be used within twenty-four hours; sterilized milk if placed on ice will sometimes keep for two weeks. Milk need not be sterilized under normal conditions, but it should be in warm weather if no ice is to be had or if there is a suspicion that the cows are not healthy or the milk not carefully handled or if there is an epidemic of diphtheria, sore throat, diarrhoea, or any of the other diseases already mentioned. Pasteurized, or sterilized, milk should be cooled rapidly by placing the bottle or vessel in cold water, not by leaving it at the temperature of the room or in an ice box.

Milk as Food. Milk should never be drunk regularly as a beverage, but should always be considered as food. It is one of the best foods for man, because it contains the four classes of food material in more nearly the proportions of a correct diet than any other single food. These food materials are protein, fat, carbohydrates and mineral matter. A quart of milk contains four ounces of nourishing material, about the same amount as six ounces of bread or three-fourths of a pound of beef. This does not mean that they have the same value

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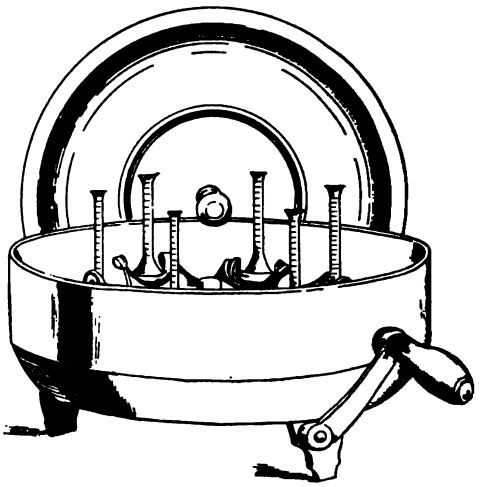
as food; milk has protein, fat and carbohydrates about in equal quantity; bread has practically no fat, and meat has practically no carbohydrates. Either bread or milk alone is a better diet than meat alone, and milk and bread together are an excellent diet, especially for children. For adults, milk and bread should be supplemented by meat and other foods. In its uncooked form milk may be added to coffee, tea and chocolate, and it may be used in making bread, cake, pastry and many cooked foods. Cream, which contains most of the fat of milk, and butter, which is made from cream, are valuable for supplying energy. Cheese, which contains both fat and protein—that is, the casein—supplies building material for the body, as well as energy. Sour milk, containing bacteria which are not harmful when taken into the body, is used to a considerable extent in cooking, in making cottage cheese, and in the preparation of koumiss.

Babcock Test. This name is applied to a method of determining the amount of butter fat in milk, invented by Dr. S. M. Babcock of Madison, Wis. The apparatus consists of a closed cylindrical box containing a rack for holding bottles, so mounted that it can be revolved rapidly by hand power or by a motor, and several glass bottles, a pipette and an acid measure.

The first step in making the test is to mix the milk thoroughly by pouring it several times from one vessel to another, for the purpose of securing an even distribution of the butter fat. This should be done as soon as possible after the milk is drawn. The necessary quantity of milk for a test is then drawn up into the pipette and placed in the testing bottle. An equal quantity of sulphuric acid is then poured into the acid measure and then into the bottle containing the milk. The acid and milk are then thoroughly mixed by giving the bottle a rotary motion and at the same time shaking it gently. After several bottles, each containing milk from different lots, have been prepared they are placed in the centrifuge, which is rotated at a speed varying from 700 to 1,200 revolutions per minute, for about five minutes. A small quantity of warm water is then added to the bottles, and they are again rotated for about two minutes. If the work has been properly done, all the butter fat rises in the neck of the bottle, which is marked with a graduated scale that tells at a glance the percentage of butter fat that the milk contains, and therefore its richness.

Condensed Milk. This is fresh milk which has first been sterilized, and then reduced to about one-fifth of its bulk by the evaporation of part of the water it contains. In other words, about five quarts of fresh milk are required to make one quart of condensed milk. When fresh milk is brought to the factory it is placed in large storage tanks, from which it is drawn off into smaller copper tanks, each holding about 1,000 gallons. By steam heat the milk is brought to the boiling point, and is then strained into the sugar mixer, where the proper proportion of cane sugar is added. Usually the proportion is about seven ounces of sugar to one pint of milk. Some condensed milk is sold fresh and unsweetened; this is usually called "evaporated," to distinguish it from the sweetened, or condensed, variety. After the sugar is added the milk is placed in vacuum pans, heated to a temperature of 140° F., and evaporated until seventy-five to eighty per cent of the water is gone. The milk is thus reduced to a thick, pasty, cream-colored mass, which is taken to the cooler and then to the packing-room, where it is sealed in air-tight cans ready for shipment. E.H.F.



BABCOCK TESTER
A small machine, with hand power.

Consult Farrington and Wall's *Testing Milk and Its Products;* Wing's *Milk and Its Products.*

Related Subjects. The reader is referred to the following articles in these volumes:

Adulteration of Foodstuffs and Clothing	**Casein**
Albumen	**Cattle**
Butter	**Cheese**
Buttermilk	**Cookery**
Calorie	**Dairying**
Carbohydrates	**Diet**
	Food

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MILK SNAKE, or **HOUSE SNAKE**, a harmless snake common in North America east of the Rocky Mountains, which gets the first of its two names from its fondness for visiting places where milk is kept. It is believed by

THE MILK SNAKE

some that it drinks milk, though this is disputed. The milk snake commonly lives upon mice which it finds in granaries and barns, and is far less harmful than the rodents it destroys. It sometimes grows to be four feet in length, and is dark gray above and yellowish beneath. Along the back and sides are black spots. It moves very quickly and climbs easily.

MILK'WEED, a widely distributed family of stout-stemmed plants, commonly known through their milky juices, curious little flowers and pods of silky seed tufts. Numerous species are found throughout America, the most beautiful being the brilliant butterfly weed. Best known of all, however, is the common milkweed, which flowers from June to September along roadsides, in fields and on waste places, from New Brunswick westward, and southward to North Carolina and Kansas. The stems grow about four feet high, bearing large, short-stemmed, hairy leaves of pale-green hue. Numerous purplish flowers grow in clusters at the tip of the stalk.

MILKWEED

These blossoms lure insects by their sweet odor, and are so wonderfully constructed that before the nectar-store is reached, the visitor's feet become entangled in a pollen mass. Some insects cannot break away, so perish, but others fly off with two bundles of pollen, strapped together like saddle-bags, securely attached to their legs. In this way cross-fertilization (which see) is insured. In the autumn large rough-coated seed pods take the place of flower clusters. When those pods burst open clouds of silky tufts bearing flat brown seeds float on the breezes and come to earth far away from the parent plants. New plants also grow from the creeping roots, so the milkweed becomes a troublesome weed. Cultivation and heavy cropping are the best means of removing this weed when it becomes a pest.

MILKY WAY, or **GALAXY**, *galaxi*, a luminous belt surrounding the heavens, caused by the radiance of countless millions of stars which form its circular path. It is divided for about two-thirds of its length into two parts, marked at intervals by dark patches. The stars in the Milky Way are all small, nearly all being of the eighth magnitude (see STAR).

The Milky Way crosses the ecliptic, at two almost opposite points, at an angle of 60° and not far from the solstices. The constellations Cassiopeia and the Swan are always in the Milky Way, and Sirius, Aquila and Capella are sometimes visible just on the edge of this silvery belt.

One of the dark spots seen in the Milky Way has been named the *Coal Sack* by sailors, because in it they could see no stars. If the earth could be removed to allow an uninterrupted view the Milky Way would be seen completely girdling the heavens.

MILL, JAMES (1773-1836), a Scotch philosopher, historian, economist and politician, called the founder of philosophical radicalism. Mill was a brilliant example of the type of man who is vitally interested in many intellectual fields, and more especially of the type which is logical in the highest degree. In all his writings he brushed aside the unessential details of a question and always endeavored to deal with first principles. Looseness of reasoning was unbearable to him, and he has well been called the "crusher of prevailing fallacies."

With the exception of his *History of India*, which was responsible at least in part for great changes in the government of that colonial possession, and is still a standard work, Mill's writings are little read to-day. Nevertheless, he holds a high place in history, for he influenced many young men who carried on his ideals and later won fame as great as, if not greater than, their teacher. Among them was his son, John Stuart Mill. He had high ideals of public service, and he lived according to them, though he risked all chances of material advancement. His influence on the Liberal politicians helped to crystallize the prevailing

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views on the equality of men. The result of this effort was the Reform Bill of 1832.

Mill was born in a little village not far from Montrose, Scotland. His father was a pious, industrious shoemaker who was not known for remarkable intelligence, but his mother seems to have been keen and ambitious, and it was through her influence that James, her eldest son, was given a superior education. At seventeen he entered Edinburgh University, and in 1798 was licensed as a Presbyterian minister. A gradual change in his religious views led him to abandon the ministry, and in 1802 he settled in London, where he became a frequent contributor to periodicals and at times was also an editor. In 1818, after ten years of work, he completed the *History of India* above referred to, which won him a high position in the department which governed that great country. In 1830 he became chief of the Indian Office, where he remained until his death.

Of Mill's many books the most important are *Elements of Political Economy,* intended originally as a textbook for his son; *Analysis of the Phenomena of the Human Mind,* remarkable for its clearness and precision; and the *Fragment on Mackintosh,* in which he stated his views of utility as the basis of ethics.

MILL, JOHN STUART (1806-1873), one of the most advanced thinkers of his time, a student and writer in the fields of philosophy, political economy and logic. His name is especially associated with the ethical doctrine known as *utilitarianism,* that the greatest happiness of the greatest number should be the sole purpose of all public action (see UTILITARIANISM). In the field of logic, especially in the subject of inductive reasoning, he did work that ranks with that of Aristotle and Hegel.

He was born in London and educated entirely by his father, James Mill, the philosopher. He began the study of Greek when three years old, and when twelve had read more Latin than the average college graduate. When fourteen, he spent a year in France, and after his return to England studied law, history and philosophy until he became a clerk in the India House, in 1823. Here he remained for a period of thirty-three years, being gradually promoted to the head of his department. After his retirement he was a member of Parliament for about four years. He belonged to the Radicals, and was a warm advocate of suffrage for women. During the last years of his life he tried to help the masses of the English people by advocating measures which would secure a more equal division of the profits of property, and he also favored coöperative agriculture. Mill began his literary labors early in life. Among his principal works are *A System of Logic, Principles of Political Economy, Utilitarianism* and *England and Ireland.*

MILLAIS, *mi la',* SIR JOHN EVERETT (1829-1896), an English painter who was endowed with a wonderful power of story-telling on canvas and the ability to interest mankind. He was born at Southampton. In his earlier days he became a leader of the Pre-Raphaelite school, together with Rossetti and Holman Hunt (see PAINTING). From them his art took a strong leaning toward the imaginative and symbolical, and the richest and most poetic of the productions of this period are his *Autumn Leaves* and *The Vale of Rest.* In 1859 he abandoned the creed of the Pre-Raphaelites and thereafter drew his subjects from many sources, painting portraits of some of the most distinguished men of his day, landscapes, of which *Chill October* is one of his most renowned, and an occasional figure piece, as *The Northwest Passage.* The value of his later paintings lies in their splendid technical qualities. Many illustrations, appearing in the leading periodicals of his time, place him in the first rank among woodcut designers. He was created a baronet in 1885, and in 1896 was elected to the presidency of the Royal Academy. Among his other notable works are *The Minuet, The Boy Princes in the Tower, Spring* and *Ophelia.* His *Bride of Lammermoor* and *Portia* may be viewed in the Metropolitan Museum, New York.

Consult Reid's *Sir John E. Millais;* Baylis' *Masters in Art.*

MILLENNIUM, *mi len' i um,* a word derived from the Latin *mille,* meaning a *thousand,* and *annus,* meaning *year,* designates a period of 1,000 years, during which, according to the belief of various sects, Christ will return to earth to rule before the end of the world. *Revelation* XX, 1-7 is quoted as authority for this belief. In the ancient Church it was generally believed that 1,000 years before the Lord were as one day of the creation as given by Moses; therefore the six days of creation would signify 6,000 years of toil and the Sabbath would represent 1,000 years of rest and happiness. Various teachers have gone so far as to appoint specific dates for the millennium, but there is wide disagreement on the subject. According to the general interpretation of the term the millennium is a period in the dim distant fu-

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ture when the imperfections of humanity will have disappeared, and the highest degree of perfection and happiness will prevail.

MILLER, CINCINNATUS HEINE (1841-1913), best known as JOAQUIN MILLER, an American poet, in life and verse thoroughly original and unconventional. The name *Joaquin,* which he adopted, was the name of a Mexican bandit of whom he wrote a defense. He was born in Indiana, but when a small child went with his parents to Oregon. The life of the new country was full of interest for Miller, and at the age of fifteen he ran away from home to live in mining camps and with the Indians in California. He was adopted by a certain tribe and married the daughter of the chief. After the death of his wife, who was killed in an accident, Miller returned to Oregon and studied law. He practiced for a few years and also edited a newspaper, but found his true calling to be that of a poet.

In 1871 Miller visited England, where he published his first notable collection of poems, entitled *Songs of the Sierras.* His colorful and musical verses, sometimes lacking in form, but full of a real love of the beautiful West and its romantic spirit, were enthusiastically received by the British public, and his picturesque Western dress, wide-brimmed hat, soft shirt, and trousers tucked into high boots, added to his popularity. His work, at first unappreciated in America, has gradually been accorded deserved recognition by his countrymen.

After his return to the United States, Miller engaged in newspaper work in New York and Washington, D. C. In 1887 the poet returned to California, where he made his home until the time of his death. Following his expressed wish, his friends burned his body and threw the ashes to the winds, on the slopes of the Sierras he had loved so well.

In addition to his *Songs of the Sierras,* his writings include *Songs of the Sunlands, Songs of the Mexican Seas* and a novel, *The Danites.* The latter has been dramatized with notable success.

Of Miller's single poems, none is better known than his spirited tribute to Columbus, which begins—

Behind him lay the gray Azores
Behind the Gates of Hercules,
Before him not the ghost of shores,
Before him only shoreless seas.
The good mate said, "Now must we pray,
For lo, the very stars are gone;
Brave Admiral, speak, what shall I say?"
"Why say, 'Sail on, sail on and on.' "

MILLET, *mil'et,* the common name for a number of cereal and forage grasses which have produced valued crops for centuries. In America millets are raised principally for hay, as soiling crops (that is, to be plowed under to enrich the soil), and for the seeds, which are used as poultry food. Almost 1,550,000 tons of millet, valued at about $11,146,000, are cut for forage annually in the United States; the largest crops are raised in Kansas, Texas and Missouri. In India about 40,000,000 acres of land are planted with millet for food purposes each year, and in Japan 35,000,000 bushels of millet

THREE VARIETIES
(*a*) Foxtail millet; (*b*) Hungarian millet; (*c*) broom-corn millet.

seed are ground into flour annually. The grain is used for bread in many other parts of Asia, and it is estimated that it supplies food to about one-third of the population of the world.

American millets may be divided into three groups; these are the foxtail millets, including that most important species, *Hungarian millet;* the widely-cultivated barnyard millets, which resemble barnyard grass; and the broom-corn millets, the common millets of Europe, a species which has loose, bushy grain heads.

Planting. According to location, millets are planted as early as May and as late as August. Most varieties are sensitive to cold, so seeding should be done when the ground is thoroughly warm. Hay crops, two or three tons to the acre, can be obtained from Hungarian millet within fifty to eighty days after planting. Rich, loamy soils are best for all millets, and soil preparation is the same as for other grasses. One-half a bushel of seed to the acre is usually sown broadcast. Millet is practically free from attacks of insects and plant diseases.

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Value for Feeding. When used in limited quantities, and not continuously, millet hay is very satisfactory for farm animals. Used exclusively, it has been found harmful. Ripened seeds are valued for poultry and birds. Crushed and ground, millet seeds are sometimes fed to stock. Broom-corn millets are most highly valued in the United States for the latter purpose.

MILLET, *me la',* or *me leh',* JEAN FRANÇOIS (1814-1875), a French painter of peasant life and landscape, generally considered the greatest of the Barbizon school. Millet was himself a peasant. As a boy he had worked in the fields, had wielded the hoe and the pitchfork, and he knew peasant life in all its phases. As he knew it, so he painted it, neither softened nor exaggerated. His greatest pictures tell with truth a simple tale of everyday life on the farm. This life is presented with a pathetic dignity and an emotional appeal seldom equaled.

Millet was born in the north of France, in a little village near Cherbourg. His father, though only a poor peasant, was a man of strong character, and his simple dignity and piety created a home atmosphere which left a deep and lifelong mark on the ideals of his gifted son. Until his eighteenth year young Millet worked in the fields with the other men and boys, but during the noon rest-hour, while they slept, he made numberless sketches of the familiar scenes about him. His talent was recognized at home, and when the time came for a decision as to his future, the family decided in solemn conclave to give him the chance he wanted.

So he began his studies at Cherbourg, and in 1837, aided by a small pension from the town council, he went to Paris to continue them. For the next twelve years his life was miserable. He was poor, and he was out of sympathy with the conventional methods of the art schools of the day. He refused to follow the fashions in painting, and earned enough to buy his daily bread by painting cheap imitations of Watteau and other masters. At one time he left Paris and supported himself in Cherbourg by painting signboards. Meanwhile, he exhibited some of his paintings, including some classical and religious subjects, but it was not until 1848 that his first important picture, *The Winnower,* brought him general recognition.

The sale of this painting and the commissions which soon began to reach him enabled him to leave Paris and buy a cottage on the edge of the Barbizon forest. There he worked for the rest of his days, surrounded by scenes he loved, to paint. There he painted the pictures which have made his name familiar the world over—*The Sower, The Reapers, The Gleaners,* one of his best works, *The Angelus* and *The Man with the Hoe.* These last three are among the world's great paintings. In *The Gleaners* Millet tells the story of the poor, for the three stooping women are not workers in the harvest field; their "gleaning" is of another kind. Among the peasants of many countries there has existed the custom, with the force almost of law, that after the harvesters have gathered in the grain the poor may come into the fields and pick up the bits that are left. Such are the three women of this painting. In *The Angelus* the painter reveals the simplicity and honesty of the peasant's religion. The peasant and his wife stop their work and reverently bow their heads in prayer, as the bells in the distant church sound the Angelus (which see).

Millet not only painted, but he produced many notable charcoal drawings and etchings. In these, as in his paintings, he drew from memory. To his habit is due in part the simplicity and breadth of his treatment. He needed no models to confuse him with details, but retained in his memory the broad and the typical features. The prevailing tones of nearly all his paintings are gray and brown, which frequently create a sad atmosphere well suited to the pathos of the subject. To the end of his days Millet was poor, if not in actual want, but soon after his death his paintings began to increase in value. In 1890, only fifteen years after his death, *The Angelus* was sold to a French collector for $150,000. R.D.M.

Consult Hurll's *Jean François Millet;* Turner's *Millet;* Tomson's *Jean François Millet and the Barbizon School.*

MILLVILLE, *mil'vil,* N. J., is a city in Cumberland County, in the south-central part of the state, forty miles southeast of Philadelphia and at the head of navigation on the Maurice River, twenty miles north of Delaware Bay. It is served by the West Jersey & Sea Shore Railroad, and by an interurban electric line, steamboats and barges. The city has an area of twenty-five square miles. The population, which in 1910 was 12,451, was reported by the state census of 1916 as 13,624 (Federal estimate).

Sand mining, manufactories of glass and glassware (especially chemists' goods), cotton goods, bleacheries and dye works are important industries. The city is a shipping center for

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fish and produce. The annual value of all products is about $5,000,000. The Federal building, library and hospital are prominent buildings. North of the city is Union Lake Park, along the shore of an attractive artificial lake two and a half miles long and a mile wide. The city received its name from its industrial mills. It was incorporated in 1801 and was chartered as a city in 1886. The commission form of government was adopted in 1913. L.R.H.

MIL'NER, ALFRED, first Viscount (1854-), an English official whose name is associated especially with the history of British colonization in South Africa. He was born at Bonn, Germany, and was educated at Tübingen, at King's College, London, and at Balliol College, Oxford. Early in his career he served as a journalist under John Morley and William T. Stead, but his first public office was that of private secretary to the Chancellor of the Exchequer (1887-1889). Between 1889 and 1892 he held the office of Under-Secretary for Finance in Egypt, and on his return to England in the latter year he became chairman of the Board of Inland Revenue.

His appointment, in 1897, as High Commissioner for South Africa and governor of the Cape of Good Hope, was the beginning of a distinguished career in British South Africa. During the troubled period before the outbreak of the Boer War (see SOUTH AFRICAN WAR), Milner showed himself one of the clearest-minded and most reliable officials in the British service, and in 1901, while the war was still in progress, he was appointed governor of the Transvaal and Orange River colonies. He continued in office until 1905, when failing health compelled his retirement. In the words of a contemporary official, "He laid deep and strong the foundation upon which a united South Africa would arise to become one of the great states of the Empire." The esteem in which he was held was evidenced by a public address of appreciation, signed by over 370,000 persons, which was presented to him after his return to England. The title of Viscount was conferred on him in 1901. Lord Milner is the author of *England in Egypt* and *The Nation and the Empire*.

MILREIS, *mil'rase,* or *mil'rees,* the name of a coin and unit of the monetary system in Portugal and Brazil. It is divided into 1,000 *reis*. In Portugal it is known as the *crown,* or *coroa*. In the money of the United States and Canada the milreis of Portugal is worth about $1.08; that of Brazil, fifty-five cents. It would therefore require about fifty-two of the *reis* of Portugal to purchase in the United States or Canada a commodity valued at five cents. See COINS, FOREIGN.

MILTIADES, *mil ti'a deez,* (? -500 B.C.), an Athenian general who won the great and decisive battle at Marathon (which see). He first appears in history as tyrant of the Chersonese, and about 512 B.C. accompanied Darius on his Scythian expedition. When the Persians invaded Greece in 490 B.C. he became one of ten generals of the Athenian army chosen to resist the Persian invasion of Attica, each of the ten to command one day at a time. On the day of his command he particularly distinguished himself by winning at Marathon. In the following year the victorious general asked Athens for a fleet of seventy vessels, and made an attack on the island of Paros in order to gratify a personal revenge. He was wounded in this attack, and when its object became known he was impeached and ordered to pay fifty talents fine. As a talent represented in modern money a sum ranging from $1,700 to $2,000, it was a heavy penalty; being unable to pay he was sent to prison, where he died of his wound, and his son, Cimon, subsequently paid the fine.

MIL'TON, JOHN (1608-1674), an English poet and political pamphleteer, author of the most-honored poem in English literature, one of the world's great epics—*Paradise Lost*. Probably no one has better expressed the world's appreciation of this master of sublime and idealistic verse than Wordsworth in his inspired lines—

> Thy soul was like a star and dwelt apart;
> Thou hadst a voice whose sound was like the sea—
> Pure as the naked heavens, majestic, free;
> So didst thou travel on life's common way
> In cheerful godliness: and yet thy heart
> The lowliest duties on herself did lay.

Milton was born on December 9, 1608, in London, where his father, a musical composer and a man of considerable learning, was established as a scrivener (a kind of notary). The boy's early instruction was received from his father and from private tutors until, at the age of twelve, he entered Saint Paul's School. Here he studied Latin, Greek, French, Italian and Hebrew and became especially familiar with the poetry of Spenser, from whom he later acknowledged that much of his inspiration was drawn. By 1625 he was ready for admission into Christ's College, Cambridge, and for seven years remained at the university, devoting himself chiefly to the study of literature and pro-

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ducing several excellent poems, among them the *Hymn on the Nativity*. For some reason, perhaps because of the refinement of his manners and the sternness of his morals, Milton was not popular at the university, where his good looks won for him the name of "the Lady of Christ's College." Before his graduation, however, his unusual abilities were fully recognized.

Early Training. From his earliest years Milton showed a fine spiritual nature, and his parents had decided that the Church was his proper calling. However, when Milton left Cambridge he found himself not in sympathy with the methods pursued by the clergy, and determined to devote himself to literature. His father, who had always shown himself most willing to provide for the development of the unusual powers which he recognized in his son, did not fail him now, but made it possible for him to have a six-year period of seclusion at Horton, in Buckinghamshire. During this time Milton pursued his studies most diligently and produced the lyrics that are regarded as the most nearly perfect of his poems. These were *L'Allegro* and *Il Penseroso*, the first describing the aspects of life which appeal most to a cheerful man, the second, those aspects in which a serious and meditative man finds most charm; the masque *Comus*, in which the beauty and irresistible power of virtue are celebrated; and the elegy *Lycidas*, written in memory of the death of his college associate, Edward King.

JOHN MILTON
From an engraving executed by George Vertue.

Period of the Commonwealth. His retirement came to an end in 1638 when he took a trip to Italy, making the acquaintance of some of the most famous men of his day. He had been abroad not much more than a year, however, when he learned of the civil struggle which was threatening at home and returned at once to England, settling in London. Identifying himself with the Puritan party, he became the chief literary defender of the principles for which that party stood and which led in time to the civil war. After the establishment of the Commonwealth Milton was made Latin secretary to the council of state, and in this office was called upon to translate into Latin foreign communications and other public documents. In 1643 he married Mary Powell, the seventeen-year-old daughter of a royalist squire; but his severity was so displeasing to the somewhat frivolous girl that she left him a month after the marriage and did not return to his home for two years. Their life from that time on seems to have been fairly pleasant. She died in 1652, leaving three daughters. His domestic unhappiness led to his writing *The Doctrine and Discipline of Divorce* and *The Tetrachordon*, in which he expressed the most extreme and distorted views. The unfavorable reception of these two caused him to write the *Areopagitica*, a defense of the freedom of the press, the best of his prose productions. Among his tracts written in defense of the Puritan party and the Commonwealth may be mentioned the *Pro Populo Anglicano Defensio* (Defense of the English People), *The Tenure of Kings and Magistrates* and *Eikonoklastes*.

His Blindness. For several years Milton's eyesight had been gradually failing, and in 1652 he became entirely blind, but with assistance was able to keep on at his work of Latin secretary until the Restoration in 1660. During this period (1656) he married Catharine Woodcock, who died in 1658, and in whose honor one of his most beautiful sonnets was written. Five years later he again married, practically driven to the step by the condition of affairs in his home. His three daughters, so early left motherless, had been sadly neglected, and grew up uneducated, selfish and thriftless. They com-

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plained bitterly when called on to read to their father, and they even went so far as to sell some of his most valued books without his knowledge. Elizabeth Minshull proved a devoted wife, and Milton's last years were passed in peace and comfort.

After the Restoration. After the return to power of the royalist party, Milton narrowly escaped the fate which other prominent supporters of Cromwell met. The last years of his life were spent in retirement and were devoted to the composition of a work for which he had

MILTON'S HOME

This building stands in Chalfont Saint Giles, little changed in appearance since 1665, when Milton fled to it from London to escape the plague. In this cottage he wrote *Paradise Lost.*

been planning for many years. He had considered several great themes before he finally fixed on *Paradise Lost* as the subject of the sublime epic which he published in 1667. Written in a style of impressive grandeur, this work represents such colossal figures as Satan and his fallen angels and the hosts of God engaged in conflict. *Paradise Regained,* a second epic, and *Samson Agonistes,* a tragedy which follows closely Greek models in construction, show a decline of Milton's power. These were both published in 1671, and three years later occurred the poet's death. He was buried in Saint Giles's Church, Cripplegate, London.

His Literary Rank. Milton's literary life divides itself naturally into three parts: the period spent at Horton, that in which he was actively in politics, and that of his final retirement. In the first period he reached a height of lyric excellence which not only he himself never attained again, but which few, if any, other English poets have reached. The prose works of the second period are elegant in style, and must have been powerful in effect in their time, but they are often biased in sentiment and violent in tone. They were of such nature, moreover, as to rouse little interest beyond their own day. A number of sonnets are the best products of this second period, that *On His Blindness* ranking with the greatest of English sonnets. In the epics the delicate beauty and airy grace of the early poems are largely replaced by majesty and sublimity, in which he was unsurpassed. All in all, he is entitled to a rank among English poets second only to Shakespeare.

Among well-known quotations from Milton may be given the following:

Where glowing embers through the room
Teach light to counterfeit a gloom.

Where more is meant than meets the ear.

And storied windows richly dight,
Casting a dim, religious light.

Peace has her victories
No less renown'd than war.

They also serve who only stand and wait.

C.W.K.

Consult Jenks' *In the Days of Milton;* Williamson's *Milton;* Woodhull's *The Epic of Paradise Lost.*

MILTON, Mass., a town of Norfolk County, which played an interesting part in the dramatic history of Revolutionary times. On the summit of Great Blue Hill, the highest of the Blue Hills, which lie almost entirely within the limits of Milton, huge signal fires were kindled to announce to the people events of special interest and importance. The repeal of the Stamp Act, the adoption of the Declaration of Independence, the surrender of Burgoyne and of Cornwallis and other similar events were so heralded, and the patriots came to have a special affection for the Great Blue Hill. To-day its summit, 635 feet above sea-level, is crowned with a meteorological observatory.

The town, which is now a residence suburb of Boston, was founded in 1640 and given the Indian name of Uncataquissett. It was originally a part of Dorchester, but was incorporated separately in 1662 and given the name of Milton, either because some of its prominent men came from Milton Abbey, in England, or because it had gristmills and paper mills, Milton being a shortened form of Milltown. To-day the manufacturing industries include the making of chocolate, paper and crackers; the raising of garden stuff, which finds a ready market in the near-by city of Boston, and the quarrying of granite. Milton is six miles from Boston, on the New York, New Haven & Hartford Railroad, and had in 1910 a population of 7,924.

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MILWAUKEE, *mil waw' kee*, WIS., the largest city of the state, and the county seat of Milwaukee County, is situated in the southeastern part of the state on the western shore of Lake Michigan, at the point where it receives the waters of the Milwaukee River. Exceptional transportation facilities are offered by the Chicago, Milwaukee & Saint Paul, Chicago & North Western, Minneapolis, Saint Paul & Sault Sainte Marie, Pere Marquette and Grand Trunk railways; the last two make connections with the city by ferries across the lake. Additional transportation is afforded by fifteen lines of steamers which communicate with all important ports on the Great Lakes. Interurban lines connect with Port Washington and Sheboygan, north; Waukesha, Oconomowoc and Watertown, west; and Racine, Kenosha and Chicago, south. The population increased from 373,857 in 1910 to 436,535 in 1916 (Federal estimate). For many years people of German birth predominated; but recently, Poles, Italians, Russians, Dutch, Bohemians and Scandinavians have entered the ranks from other nations, and at present only seventeen per cent are German born. The city occupies twenty-four square miles, a smaller area than that of any other city of the United States of about the same size, but it does not present the uncomfortably crowded conditions so frequently a feature of great cities.

Suburbs. The population has spread into several suburbs of considerable size, among these being West Allis, containing the immense machinery plant of the Allis-Chalmers Manufacturing Company; Wauwatosa, where are located a National Soldiers' Home occupying 400 acres, the State Fair Grounds, a group of county institutions, including almshouse, hospitals and asylums, a number of industrial establishments, a Carnegie Library, Lutheran homes for the aged and orphans, stone quarries, large market gardens and nurseries; Cudahy, largely devoted to meat-packing, heavy machinery and rubber industries; South Milwaukee and North Milwaukee, with large manufacturing establishments; and Saint Francis, the seat of Pio Nono College and other important Roman Catholic institutions.

Parks and Boulevards. Milwaukee has a beautiful location on a bluff overlooking Lake Michigan from a height of 150 feet. Much of the residence district is built on this bluff, and it is noted for its attractive shaded avenues and handsome dwellings. Grand Avenue, Prospect Avenue, Waverly Place and Lake Drive are classed with the finest streets in the Union. The city has assigned about 1,000 acres to its thirty-six parks; of these, Juneau Park, extending along the lake bluff, is the most picturesque; it contains statues of Leif Ericsson, the navigator, and Solomon Juneau, founder of the city. Lake Park, also on the shore; Evergreen Park, the largest; Mitchell Park, with its rare collection of plants and flowers, and Washington Park, with its zoölogical garden, are among the other noteworthy recreation grounds. Statues of Solomon Juneau, the founder of the city; Ericcson, Goethe, Schiller, Burns and Kosciusko and a soldiers' monument occupy conspicuous positions in advantageous spots in the city.

Buildings and Institutions. Milwaukee has a number of fine public and office buildings. Formerly so many of the residences and store buildings were constructed of cream-colored brick, a product of the vicinity, that the city became known as *The Cream City*. Other building stones have recently been used in the construction of some of the noteworthy buildings,

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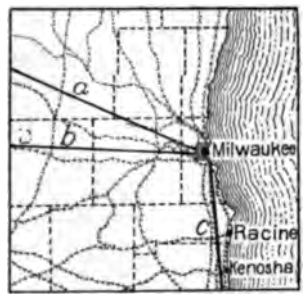
which include the city hall, the $3,000,000 Northwestern Mutual Life building, built of marble, the Marshall and Ilsley Bank, First National Bank and the Wells, Pabst and Majestic buildings, the $2,000,000 granite Federal building, and the county courthouse, constructed of brown sandstone. Other prominent structures are the public library and museum containing 288,360 volumes and a noted collection of firearms; the Auditorium, the Art Gallery and the Jesuit, Saint Paul's (Protestant Episcopal), and Immanuel (Presbyterian) churches.

Milwaukee is the see of a Roman Catholic archbishop and a Protestant Episcopal bishop. It is a city of homes, numbers of laborers owning their dwellings. There are about 190 churches, and a fine public school system which provides for the education of the blind and the deaf, a business school, a fresh-air school and a school of trades for boys and girls, the first of its kind in the United States. In addition to these there are parochial schools, Marquette University (Catholic), Concordia College (Lutheran), Milwaukee-Downer College and Milwaukee-Downer Seminary, both for women, Wisconsin Industrial School for Girls, the National German-American Teachers' Seminary and one of Wisconsin's state normal schools. Of the city's eighteen hospitals, Saint Mary's and Mount Sinai, modern, excellently-equipped institutions, are the most noted.



LOCATION MAP
(*a*) To Saint Paul, 325 miles; (*b*) to Madison, 82 miles; (*c*) to Chicago, 85 miles.

Commerce and Industry. For commercial purposes the city has a fine location on the Milwaukee River and its tributaries, the Menominee and Kinnickinnick rivers, which have been widened to permit vessels to enter the heart of the city, making the harbor one of the best on the Great Lakes. These rivers divide the city into three sections, which are connected by a number of viaducts and bascule bridges, and the shipping facilities they provide contribute toward making the city one of the chief manufacturing and commercial centers of the north-central section of the United States. The principal articles of its extensive commerce are wheat, barley, oats, corn, rye, flour, lumber, coal, iron ore and salt. The annual receipts of grain amount to 87,000,000 bushels, and the grain elevators have a storage capacity of 16,500,000 bushels. In the production of flour it has a high rank among the cities of the United States.

One of the most prominent industries, and one for which Milwaukee is famous, is that of brewing, the annual product exceeding 4,000,000 barrels of beer. There are also vast rolling-mills, and manufactories of leather, in which it ranks second in the United States, and iron, steel and heavy machinery; in the three last named, nearly 22,500 people are employed, the annual output being estimated at over $61,000,000. Two of the city's tanneries are among the largest in the United States. Other important manufactures include boots and shoes, malt, electric and telephone supplies, railroad equipment, furniture, stoves and furnaces.

History. Father Marquette and Louis Joliet were the first Europeans known to have visited the site of Milwaukee (1673), and about a century later a French fur-trading post was established here. In 1818 Laurent Solomon Juneau and several associates built their homes and began the settlement of the city, Juneau being generally considered the founder. The east side was platted in 1835; the settlement of the west side soon followed, then the third settlement on the south, known as Walker's Point, was platted independently. These three settlements were incorporated as the city of Milwaukee in 1846, and Solomon Juneau was elected the first mayor. Immigration from Germany began in 1840, and continued for half a century, bringing to Milwaukee many Germans of the educated class, and for many years German customs prevailed. During the War of Secession an entire company was formed of German Turners. The first newspaper, the *Advertiser,* was published in 1836, and the first bank was established in 1837. In 1851 the first train sped over the Chicago, Milwaukee & Saint Paul Railway to Waukesha. Chicago was connected by telegraph in 1849 and by rail in 1856. The city was visited by a fire in 1892; about 2,500 people were made homeless by the destruction of 300 buildings, the loss being estimated at $6,000,000. Milwaukee is an Indian name which means *good land.* H.A.P.

MIMEOGRAPH, *mim'e o graf,* a copying device invented by Thomas A. Edison. The original mimeograph consists of a steel plate about eight inches long and three inches wide, with a large number of very fine lines engraved on

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its surface; a frame for holding a sheet of paper coated on one side with paraffin; a stylus for writing, a bed plate, and an inked roller. The prepared paper is laid upon the steel plate wax side up, and the stencil made by writing on the paper with the stylus, the steel plate cutting through the paper so that ink passes through. The stencil is placed in a frame attached to the bed plate by hinges. The bed plate consists of a frame holding the steel plate and a piece of slate, upon which the paper to receive the print is laid. The copy is made by passing the inked roller over the stencil, using enough pressure to force the ink through. By working carefully several hundred copies can be made from one stencil.

The original mimeograph is now seldom used. The typewriter has taken the place of the corrugated steel plate and the stylus, and a cylinder to which the stencil is fastened and which contains an automatic inking device takes the place of the old frame and bed plate. As the cylinder revolves, the paper to be printed is fed into the machine. A mimeograph of this pattern operated by an electric motor will print 5,000 copies an hour.

The mimeograph is also used for making copies of drawings, report blanks and other forms. A device known as the mimeoscope is designed especially for this work. Prices of mimeographs range from $15 for the old-style pattern to $160 for the most complete machine with an electric motor.

MIMICRY, *mim'ik ri,* a term frequently used for protective coloration or protective resemblance, with reference to certain insects, birds, etc. It is described under the title PROTECTIVE COLORATION.

MIN'ARET, a slender structure of stone or brick, forming the tower of a mosque. It consists of several stories marked by balconies, is cylindrical or polygonal in shape and terminates in a pinnacle or small dome. Each mosque has one or more minarets; the mosque at Mecca has the exceptional number of seven. The Mohammedan's call to prayer is not by bell, but by the voice of an official termed *muezzin* (see below). The minarets of Spain, Egypt, Syria, India, Persia and Turkey, constructed between the thirteenth and sixteenth centuries, are among the most beautiful and original works of Eastern architecture.

Muezzin, *mu ez'in.* Five times daily the devout Mohammedan, wherever he may be, turns towards Mecca and prays, and the muezzin is the one whose duty it is to call the time for these prayers. He stands on the balcony surrounding the minaret, or prayer tower of the mosque, or if this is small and has no such tower, he stands at the side of the building. At dawn, at noon, at four in the afternoon, at sunset and at nightfall, the muezzin calls to prayer, each time saying, "Allah is great. I testify that

THE CALL TO PRAYER

Mohammed is the Apostle of Allah. Come to prayers. Come to salvation. There is no god but Allah." It is an honor to hold the office of muezzin, and one who does so is assured of heaven.

MINAS BAY, or **BASIN OF MINAS,** *me' nahs,* the name of the southeast inlet of the Bay of Fundy, extending into Nova Scotia about fifty-five miles. On the south shore of this bay is situated the village of Grand Pré, celebrated in Longfellow's beautiful *Evangeline.* The tides rush into Minas Bay with great force, sometimes, at the equinoxes, reaching a height of sixty to seventy feet. In Halifax harbor, on the southeastern coast of Nova Scotia, the spring tides rise only to a height of six to nine feet. The principal river emptying into Minas Bay is the Avon, on whose banks are situated Windsor and other flourishing towns. See EVANGELINE.

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MIND. There are but two entities in the world—*mind* and *matter*. Many learned men have defined them, with more or less success, but possibly the difference between the two has been as clearly stated by a shrewd layman. When asked, "What is matter?" he said, "Never mind;" and to the inquiry, "What is mind?" he replied, "No matter." All that is really known is that the mind is the principle in human beings which thinks, feels, wills, remembers, desires and reasons. No one knows just what it is, or what it is made of, and many theories have been advanced to account for its existence and its functions. Notwithstanding the great differences in these theories, however, all psychologists at the present time agree that the mind and body are interdependent, that each depends upon the other for existence. Somewhere the mind and body make a vital connection, although no one yet has discovered where the connection lies. Men smile when pleased, frown in anger, quiver with fear; mental emotions somehow send their messages to the nerves and muscles, so that there is an outward physical expression of every mood and shade of feeling. Mental depression can produce actual physical sickness; the value of cheerfulness in helping to cure diseases is well known. Any excitement, whether pleasant or unpleasant, affects digestion.

On the other side, there is a strong influence of the body on the mind. Everyone can note for himself the difference in his feeling of well-being, in his emotions, when he is hungry or satisfied, in pure or impure air, in cold or warmth, in health and disease. All of this is a mystery to psychologists, philosophers and biologists. This mystery of the relation of the mind to the body and the body to the mind forms the greatest problem of metaphysics, and is called the mind-and-body problem.

For the development of the mind, see PSYCHOLOGY, subhead *Development of Mental Powers*. Consult Baker's *Elements of Psychology*; Maher's *Psychology*; for young people, Baldwin's *The Story of the Mind*.

MIND READING. The belief in a possibility of communication between mind and mind apart from the recognized use of the senses is an ancient one. It appears in the popular beliefs in second-sight; also in the clairvoyance of mediums and the accrediting of special powers to seers. The attempt to give the thesis a scientific expression and test gave rise to the term *telepathy* (which see). While some investigators have become convinced of the irregular action of such a force, the general verdict is entirely against such a supposition. The support of such a view lies in a type of "reading" which may be referred to the acute interpretations of subconscious and involuntary indications. Under this view the process should be called *muscle reading*, and not mind reading.

When the muscle reader attempts to find a concealed object, he places the hand of the person who knows the place of hiding upon his forehead or arm, and by tentatively taking a step in this and that direction and feeling the resistance or yielding of his guide, takes a route more or less irregularly to the concealed object. He is guided by the involuntary yielding and resistance. With a favorable subject the promptness and delicacy with which the movements may be interpreted make possible an amazing performance. The numbers of bank notes may be selected by guiding the hand over the digits from 0 to 9. Experiments have shown any thought sets up a slight, involuntary tendency to move or incline in the thought-of direction; involuntary whispering has been similarly observed. It has been established that animals associated with man—horses and dogs—observe such indications. This power explains some of the otherwise incredible performances of trained animals; the performer (often sincere in his belief in the animal's mind-reading) gives an involuntary indication which the animal detects and responds to. On the other hand, the public performances of mind-reading in which messages are read depend upon a code or other device. J.J.

Relating to Various Beliefs. The articles on the following topics, while not bearing directly on the subject treated above, may be of interest in this connection.

Alchemy	Palmistry
Astrology	Phrenology
Clairvoyance	Physiognomy
Conjuring	Psychical Research
Demonology	Psycho-Analysis
Divination	Spiritualism
Faith Cure	Subconscious
Hypnotism	Suggestion
Magic	Superstition
Medium	Telepathy
Mesmerism	Theosophy
Necromancy	Trance
Occult	Witchcraft

MINERALS AND MINERALOGY. Everything in or on the earth, everything which man sees or knows about, belongs to one of two great classes: either it is alive or is the product of life, or else it has no life. The first division

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includes all forms of animal and plant life; the second division includes all minerals.

What Is a Mineral? Animals and plants have their beginning; they grow up, and they die after a longer or shorter existence. Animals have organs, which they use for eating, drinking, breathing and other purposes. Most animals are able to move from place to place, and even those which are unable to move about —the coral, for example—are able to move parts of their bodies. Plants are simpler in structure than animals, yet they, too, have organs for various purposes. Minerals, on the other hand, have no organs, and show no signs of life. A mineral does not grow by assimilating food, but by additions from the outside. A piece of mineral may be broken into a dozen pieces, but each piece is exactly as much a mineral as before. In an animal or plant, however, each part has a special purpose, and it is maimed or destroyed if it is cut into pieces.

This difference between minerals and animals or plants can be expressed in a more scientific way by saying that a mineral is *homogeneous;* in other words, every part of it is like every other part. An animal is composed of bones, flesh, blood, skin, hair or fur and the like, whereas a mineral is only one thing. A gold nugget is only gold, and every part of it is gold. This does not mean that a mineral cannot be divided into its components. On the contrary, one of the essentials of a mineral is that it has a definite composition which may always be expressed by the same chemical formula. Every mineral is composed of one or more *elements,* usually two, in a fixed proportion. See CHEMISTRY, subhead *Elements.*

A mineral, strictly defined, is a "substance of definite chemical composition which has been directly produced by the processes of inorganic nature." Products of the laboratory or furnace are not minerals, although they may be similar to them. Coal, which is a vegetable product, is not a true mineral, but it is usually treated as one for convenience because it is formed like a mineral and has many of the characteristics of minerals. With the exception of water and mercury (quicksilver) all minerals, in their normal state, are solids.

Difference between Minerals and Rocks. Minerals, it is understood, are elements in chemical combination. Rocks are large masses of minerals in physical or mechanical combination. A few rocks, to be sure, are composed of only one mineral; marble is one of these. But most rocks are composed of a mixture of two or more minerals, and these minerals are not always present in the same proportion. A lump of granite contains quartz, feldspar and mica; it is still granite whether there is little mica, or much, whether there is little quartz or whether quartz forms half the rock. In a piece of granite, the mica is there as mica, the feldspar as feldspar, and the quartz as quartz. If a piece of granite is crushed to fine bits, the pieces will be pieces of mica, feldspar and quartz, not of granite. A mineral, when it is pure, always has the same weight per unit of measure. The weight of a rock, such as granite, varies with the percentage of minerals composing it. A rock has no particular form or color; these characteristics depend on the minerals of which it is composed.

Distinction between Metallic and Nonmetallic Minerals. Minerals may be divided into two classes, *metallic* and *nonmetallic.* The metallic minerals are opaque and usually have a shining appearance, or metallic luster. When polished they reflect light like a mirror. As a rule metallic minerals are heavy. From them is extracted most of the gold, lead, silver, iron, tin and zinc of commerce. The nonmetallic minerals are transparent, at least on thin edges. Many are glassy in appearance. Most of them are not heavy. Gold, silver and hematite are metallic minerals. Quartz, feldspar and calcite are nonmetallic. Most of the minerals composed of but one element are metallic, but sulphur and the diamond are exceptions. The majority of metallic minerals are compounds of two or more elements. Such are galena, the ore of lead, and chalcocite, the dark copper ore. A few minerals, such as the dark mica, are metallic in appearance, but are transparent and in other ways are unlike metallic minerals. They are called *submetallic.*

Origin and Formation of Mineral Deposits. It is now generally believed by scientists that the interior of the earth is not hollow, but is composed of great masses of minerals. Just how the minerals reached the surface nobody knows, but from natural processes which can be seen in operation to-day scientists reason by analogy about the past. Almost all of the important minerals, moreover, have been successfully produced artificially, and the information gained by experiment has thrown considerable light on the formation of natural minerals. All minerals, apparently, once existed in a fluid or molten state, and became solids in one of three ways. Each of these ways is best understood from an example.

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Salt, a mineral by *crystallization.* A cup of water, in which has been placed a quantity of salt, will show how the great salt deposits in various parts of the earth have been formed. When all the salt that will dissolve has been put in water, the solution is said to be *saturated;* that is, the water will take up no more salt. If this cup of salt solution is placed in the open air the water will slowly evaporate, and little crystals of salt will form on the sides of the dish. When the water is completely evaporated, tiny salt crystals will be found on the bottom and sides of the dish. In this manner soda, borax and rock salt deposits are formed; these minerals were once in solution in the water of ponds and lakes, and when the water, for one reason or another, dried up or changed its position, the mineral deposits, more or less mixed with mud, were left on the bottom. Most of the great iron deposits were formed in a similar way, although usually the bogs or beds of liquid were slowly subjected to great pressure and underwent a change to the crystalline form.

Salt and many other minerals were once dissolved in water deep down in the earth. Sometimes the water was hot, a condition sufficient to cause solution, and often it held a number of minerals which acted on each other to preserve the solution. In the course of ages the water was forced upward toward the surface of the earth and gradually became cooler. The pressure on it became less, and little by little the minerals which it had carried in suspense were deposited. As these deposits dried and hardened, veins of quartz, calcite, gypsum, gold and other minerals were formed. The many mineral springs which are still flowing in every part of the earth show us how these veins were formed centuries ago.

Sulphur, a mineral by *condensation.* A few minerals seem to have existed in the earth's interior in the form of vapor or gas. As this vapor found its way toward the surface, it was cooled and condensed on the walls of the cracks in the earth's crust. Here it is often mixed with other minerals, such as iron pyrites, but it is also found in the pure state. This method may be illustrated by a simple experiment which any parent or teacher can conduct. Take a little sulphur and place it in a glass tube closed at one end. If the sulphur is heated over the flame of a lamp, it will soon begin to change to a brownish-yellow vapor. The vapor will rise in the tube, and when it reaches a cool part will condense on the sides. The upper part of the tube will be covered with little yellow specks.

Quartz, feldspar and other igneous minerals. Igneous fusion is the third method by which minerals were formed. This means that a great mass of mineral matter was once heated (*ignis* is the Latin for *fire*) to a fluid condition. As the fluid slowly cooled the different elements grouped themselves according to their chemical attractions, or likes and dislikes, as they might be called. Molecules of feldspar will form and attract others; molecules of hornblende, of quartz and other minerals will do the same. When the whole mass is finally cooled there will be distinct smaller masses of each mineral. If, however, the molten mixture cools rapidly, the molecules of the different molecules will not have time to group themselves, and they will form a mass like obsidian, or volcanic glass.

Characteristics of Minerals. No matter where or how a certain mineral may have formed, its characteristics are nearly always the same. Quartz always tends to assume certain geometrical forms. Its hardness, specific gravity, luster and the way it conducts light and heat are about the same in all specimens, no matter whether they have crystallized from a lava or from waters underground. To a certain degree, the characteristics of a mineral depend upon the element or elements which it contains, but other less-known factors also contribute to the individuality of a mineral. Graphite and diamond are both pure carbon; one is soft, the other hard. Graphite is black and greasy; the diamond is transparent and sparkling. Copper when pure is reddish and metallic. Malachite, a combination of copper, carbon dioxide and water, is green. Azurite, which has the same ingredients as malachite, but in different proportions, is blue. Both malachite and azurite, unlike native copper, are nonmetallic. The study of the characteristics of minerals is one of the principal functions of mineralogy.

Mineralogy, the Science of Minerals. In addition to the study of the origin and occurrence of minerals and their classification, mineralogy treats of the characteristics of minerals. These may be divided into three kinds—the morphological, the physical and the chemical characters; these are discussed below.

Crystallography. This branch is morphology, that is, the study of form. Crystallography includes the description of crystals, their character and classification, besides the methods

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used to express them in signs and symbols. While it is true that all minerals, except mercury and water, are solid substances, they were once fluids. When a mineral, which is a homogeneous substance, passes from a fluid to a solid state, its particles attract each other along definite lines and build up a solid which shows by its outward form that there is a definite relation between all its parts. Such a solid is a crystal.

Physical Mineralogy. This branch deals with the physical characteristics of minerals, their hardness and weight, transparency or translucency, color and luster, elasticity, malleability, tenacity, ductility, and finally their effect on the senses of touch, taste and smell.

Chemical Mineralogy. The chemical composition is the most important characteristic of a mineral, and is the basis of all modern classifications of minerals. All of the known chemical elements have been found in minerals, and minerals are the only known source of many of them. On the other hand, a few elements, such as nitrogen, are rare in minerals. The ordinary methods of analytical chemistry are used to determine the chemical composition of minerals. E.S.

Consult Shinn's *The Story of the Mine;* Crosby's *Common Minerals and Rocks;* Dana's *Minerals and How to Study Them.*

Related Subjects. The reader who is interested in the subject of minerals and mineralogy will find much helpful information in the following articles in these volumes. Not all the minerals are listed here, but if the reader will consult such topics as GEOLOGY, CHEMISTRY and METALS he will find indexes which will supplement this one and bring the whole subject within the range of his reading.

Agate	Emerald
Alabaster	Emery
Almandine	Feldspar
Amethyst	Fluor Spar
Aquamarine	Fulgurite
Asbestos	Garnet
Asphalt	Geology (with list)
Bauxite	Heliotrope
Beryl	Hone
Bitumen	Iceland Spar
Brimstone	Jade
Calcite	Jasper
Carbon	Jet
Carbuncle	Kyanite
Carnelian	Labradorite
Chalcedony	Lapis Lazuli
Chemistry (with list)	Magnetite
Chromite	Malachite
Coal	Metals (with list)
Copper Glance	Mica
Corundum	Mining
Crystallization	Onyx
Diamond	Opal
Phosphorus	Silica
Plumbago	Silicon
Pyrite	Steatite
Pyroxene	Sulphur
Quartz	Talc
Ruby	Topaz
Rutile	Tourmaline
Salt	Turquoise
Sapphire	Water
Sardonyx	

MINERAL WATERS, certain spring waters filled with various mineral substances, such as sulphur, lime, magnesia, silica, salt or iron, which have been dissolved by the carbonic acid or alkalies and collected as the water seeped through rocks to an outlet. Such springs have always attracted tourists, especially health-seekers, in great numbers, for their curative qualities are supposed to make them a remedy for many chronic ailments. Physicians attach little importance to them, however. There are over 10,000 mineral springs in North America, about 800 of which have more or less commercial, if not actual, curative value. Most of these are in the eastern part of the United States, especially New York and the Mississippi Valley, the best known being at Saratoga Springs, N. Y., Hot Springs, Va., and Hot Springs, Ark.

The famous springs at Saratoga, N. Y., are reputed to be helpful to those suffering from diseases of the liver, spleen and skin, and from neuralgia, rheumatism and dyspeptic troubles. At Hot Springs, Va., are the Berkeley Springs and White Sulphur Springs, the waters of the former being valued as a cure for dyspepsia and diseases of the liver and bowels, while those of the latter are used in the treatment of gout, rheumatism and similar ailments. The Hot Springs of Arkansas are among the most notable in the country; many people visit them hoping to be cured of diseases of the blood.

Travelers abroad often visit the famous springs at Aix-la-Chapelle in Prussia, Karlsbad in Bohemia, or Baden-Baden in Germany, while a number of foreign mineral waters are imported to the United States, such as Apollinaris from Germany, Hunyadi-János from Hungary and Vichy from France. Apollinaris is sometimes used to treat nervous irritation accompanied by dyspepsia, and is a well-known table beverage. Hunyadi-János is a standard relief for habitual constipation and for gouty disorders.

MINERAL WOOL, also known as MINERAL COTTON, is a substance used for packing around steam pipes to prevent the escape of heat, and for matting under floors to deaden sound.

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It is prepared by forcing the molten slag of a blast furnace through a crescent-shaped opening by the pressure of steam. The slag cools in long, fibrous threads, which are pressed into mats. It is an excellent nonconductor of heat, and cannot be set on fire, hence it forms a valuable material for packing around any heated object. It is employed as a covering for steam boilers and pipes to prevent loss of heat, and also to protect water pipes from frost.

MINERVA, *mi nur' va,* in classic mythology, was the goddess of wisdom, science and the arts, known to the Greeks also as *Athene.* She is represented in legend as the daughter of Jupiter and Metis. Shortly before her birth her father swallowed her mother, and it came to pass that Minerva sprang full-grown from the head of Jupiter, clad in shining armor and singing a triumphant song of victory. Many attributes are ascribed to her by myth writers. As patroness of the arts and industries she supervised the building of the wooden horse which caused the fall of Troy (see TROY), and she directed the construction of the *Argo* (see ARGONAUTS).

From his awful head
Whom Jove brought forth, in warlike armor drest,
Golden, all radiant.
—SHELLEY.

She presided over agriculture and navigation, spinning, weaving and needlework, and though a warlike divinity, bestowed her favor only on those who practiced defensive warfare. Ulysses was her favorite warrior. It is told that Minerva invented the flute, and that she cast it aside because Cupid laughed at her puffed cheeks as she was playing. In the reign of Cecrops, first king of the Athenians, she contended with Neptune for the possession of their capital city. Neptune produced a horse as the most useful gift to mankind; Minerva brought forth the olive, and to her the gods awarded the city, which was named Athens, in honor of her Greek name, Athene. The olive tree was sacred to Minerva, and oxen and cows were offered as sacrifices to her. She is sometimes represented wearing a gilt helmet and carrying a shield, and sometimes she is clad in the garb of a Grecian matron. She was the only one of the gods to whom Jupiter ever entrusted his wonderful shield, the aegis, which bore in its center the head of Medusa.

Consult Gayley's *Classic Myths in English Literature and in Art.*

MIN'IMUM WAGE. When the Australian state of Victoria, in 1896, decided it unwise for a worker to be paid less money than he needs to keep himself and his family in good condition, and created boards with power to determine the least wage which employers in certain trades might pay, the step was considered a bold experiment. Agitation for similar legislation in other countries received encouragement from neither capitalists nor wage earners. Not for fourteen years was there any imitation of Victoria, but thereafter the principle of the minimum wage quickly spread. In 1910 boards were created in Great Britain, where it was found that in one industry about one-fourth of the employees received less than five and a half shillings (about $1.35) a week. The principle was adopted by Massachusetts in 1912, in 1913 by Wisconsin and seven Western states, in 1915 by Arkansas and Kansas and the republic of France. Other states have appointed commissions of investigation. The American laws apply only to women and children. Utah has fixed the amount of wages; some states give this power to boards, others merely give the boards power to recommend.

The theory of the minimum wage is that an industry which cannot afford to pay a "living wage" is a detriment rather than an asset to a community. Oregon, after a year under its law, determined by an investigation that it had not resulted in the displacement of women by men, that it had not tended to lower the wages of the better-paid women, and that it had increased the cost of commodities only three mills per dollar, that is, three-tenths of one per cent. Massachusetts and Washington have reached similar conclusions. It is generally conceded that the establishment of minimum wages increases efficiency and adds to cheerfulness and contentment.

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MINING, a general term relating to the practice of working in the earth for valuable minerals of all kinds.

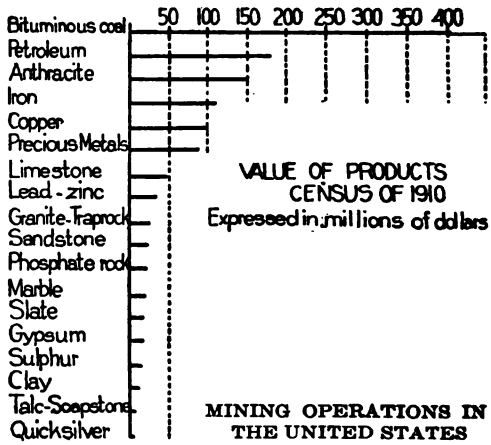
It has often been said that the history of mining is the history of civilization, and that by the progress of mining mankind measures its own advance. The earliest period of man's existence is the Stone Age, a term which suggests a brutelike creature with intelligence sufficient to overcome the wild beasts. Man lived like the beasts, but he knew enough to use rocks and stones as tools and weapons.

The Stone Age lasted for thousands, perhaps tens of thousands, of years. Then man found the first metals. Probably gold was the first to be discovered, for it is found in its pure state in many parts of the world, it is shiny and attracts the eye, and frequently lies on the surface. After gold came copper, and then tin, and when man learned to mix copper and tin to make bronze, the Bronze Age began. The stone users were no match for invaders armed with bronze weapons. So well did bronze serve man that for centuries he looked for nothing harder. When the Spanish adventurers invaded Mexico in the sixteenth century they found the Aztecs still using bronze weapons and implements of peace. With gold and silver they were familiar, but of iron they were totally ignorant.

Who first forged iron? The answer must always be a mystery. Pure iron is practically unknown on the earth except in the form of meteorites, and the earliest iron tools were probably made from these. Because iron ore bears no resemblance at all to the metal it contains, iron became known to man only at a comparatively recent time. Even had he learned of its existence, the difficulty of separating it from its rock matrix was very great. To this day, in remote parts of the world—in Africa, in the Malay Peninsula—the natives use primitive methods to obtain the iron; a simple hearth is operated by a pump or only blown by the winds, and the heated metal ball is beaten to drive out the impurities.

In the course of centuries the users of iron conquered the users of bronze, and the Iron Age began. In Africa, so far as present knowledge goes, the natives have always used iron. In ancient Greece iron was given as a prize in athletic games. The ancient peoples made deities of their smiths, Vulcan, Hephaestus and Thor, and the commonness of the name *Smith* in every language shows the importance of the occupation in later days. The present age uses iron in the form of steel, and it is not merely idle speculation to wonder if the twentieth century will not some day be known as the Steel Age.

The minerals for which men dig are not evenly distributed throughout the crust of the earth. Diamonds, for example, are comparatively rare, a fact which partly explains their great cost. Iron, copper and tin, though com-



MINING OPERATIONS IN THE UNITED STATES

mon, are less abundant than coal, which is found under a great part of civilized America and Europe. How many people who enter a jeweler's shop consider the stories of the minerals which they see—stories full of romance, of toil, of hope, and sometimes of despair of enslaved natives. There is the gold of many countries, and the silver of Mexico, Nevada, Bolivia, Spain; there is tin from Cornwall and Malacca; copper from Lake Superior's shores,

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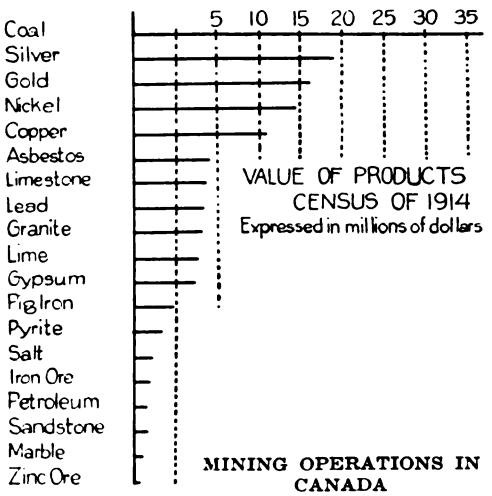
and platinum from the Ural Mountains. Those glittering diamonds have come from Kimberley, or perhaps from Brazil; the rubies from Burma; the emeralds from Peru; the sapphires from Ceylon, and the turquoises from Persia. In your town there may be a foundry, which possibly receives iron mined in the British Isles, France, Germany, Austria, Russia, Sweden, Italy, Spain, Siberia, Canada or the United States. The grocery store has sulphur from Sicily or Louisiana, and salt from Austria, Great Britain, Michigan or New York, and the stonemason may have Italian marble side by side with Vermont granite and Welsh or Pennsylvania slate.

Back of the production of these minerals is the story of the pioneers. The search for minerals, especially the precious metals, is a record of romantic and thrilling episodes in the lives of individuals and of nations. In their day the Phoenicians went to the ends of the known world, to South Africa and to Spain, for gold, silver and copper. It was the wealth they won from the mines of Spain which later made the Carthaginians rich and powerful enough to defy the power of Rome. Spain became the Roman Siberia, where thousands upon thousands of slaves spent their lives in the mines for the glory and wealth of Rome. In more recent times the discovery of new mineral deposits has always been followed by quick colonization and slower civilization. The prospector, the gold seeker, has always pushed far ahead of organized society. It was the lure of



MINING OPERATIONS IN CANADA

precious metals and gems which led men to the four corners of the earth—to India, America, Africa and Australia. In Mexico, Peru, British Columbia, California, New South Wales, the Transvaal, Alaska, the Yukon and Porcupine —wherever yellow nuggets or traces of gold have been found towns have sprung up in a night, as if by the magic of Vulcan or Thor. Civilization treads on the heels of the gold-digging adventurer.

Prospecting. The discovery of deposits of valuable minerals calls for a great deal of knowledge and experience. The presence of iron is often suspected from the rusty appearance of rocks. Beds of magnetic iron are often discovered by the peculiar influence they exert on the magnetic needle. Reservoirs of petroleum are marked now and then by oily springs. But even when mineral deposits are known to be present in the soil, it is necessary to determine how extensive they are before money can be safely expended in mining operations. There are several ways of finding out just how rich the deposit is. Underground borings may be made here and there, following the mineral layer, or seam; or a number of holes may be driven from the surface of the ground, piercing the seam at intervals. If these explorations indicate a rich bed of ore, preparations for mining are made.

Kinds of Mines. The kind of mining to be followed depends in each case upon the nature and position of the deposit. Much ore is found spread under the earth in layers of varying thickness, level or with only a slight grade. On the other hand, ore is occasionally found in layers that are almost vertical, or it may occur in separate pockets. The depth at which it is found varies greatly. Some exceedingly deep mines, like the Calumet and Hecla copper mine, at Calumet, Mich., go down into the earth more than six times the height of the Woolworth building in New York, or nearly a mile. Deep mines of this sort often, indeed, somewhat roughly resemble the interior of a modern office building with its layers of floors. The hole, or shaft, cuts through a number of beds of mineral, all rich enough to be workable. In such a case, mining goes on simultaneously on several levels, precisely like the work in a factory, and the miners are lowered to their work in a cage which is quite like the elevator in a modern office building.

Not all mines, of course, are entered by means of vertical holes. Seams of coal often reach the surface, and nothing is commoner in the American Middle West than to see the mouths of mines, looking like rather dirty caves, leading directly into the sides of hills. A passer-by,

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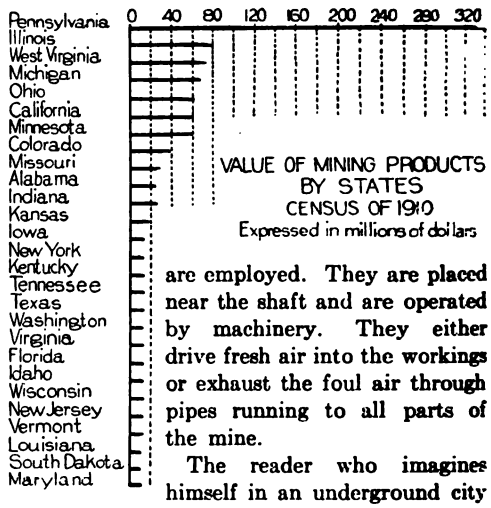
glancing into these black holes, may occasionally catch the gleam of a miner's lamp dancing far down like a will-o'-the-wisp.

When a shaft has been driven down to tap the bed, galleries are driven in all directions, following the seam. There are main tunnels and numerous branching tunnels, leading to the spot where the miners are at work. Certain great mountains in the West are simply honeycombed with such workings. Unless the mines are lighted by electricity, the men work, half-naked, in a world of blackness, except for the little islands of light cast by the pit-lamps they wear on their caps. Each man, so to speak, carries his own sun about with him, and this sun has to be carefully shielded with a gauze covering so that it will not ignite the gas and cause a shattering explosion.

Coal Mining. Coal mines being the most common, it is the work in coal mines that is described here. The miner descends into the pit by means of a cage lowered and raised on a wire rope, wound upon a drum. He follows the main tunnel, in which a track for the running of small trucks is laid, to the branching gallery that is nearest his work. Once at the working face, he sets about the day's work with drill, pick and shovel. With the pick and shovel, or with a modern machine, called an *undercutter,* he undermines a ledge of coal. Above he makes numerous small holes with the drill and inserts charges of black powder in the glistening black surface. The blast is set off and the coal is shattered and falls to the floor. The miner's task is then to sort it and load it into small trucks, which are later hauled to the mouth of the pit, either by mules or at the end of a cable such as is used in pulling cable cars through the streets of a city. In some mines, where the seam is shallow, blasting cannot be done to advantage, and the coal has to be brought down by hand.

Accidents. One of the terrors often present to the mind of the worker underground is the fear that the roof will fall on him. In spite of all the precautions that are now taken, such accidents claim more victims than any other sort. More than 1,000 miners lost their lives from caving roofs in 1913, out of a total death-list of 2,785. To prevent this, the crushing weight of rock and soil above has to be firmly supported, either by stout pillars of coal left standing here and there, or by timbers anchored against ceiling and floor. These props, or struts, are left standing in the active workings, but when parts of a mine are abandoned, it is usually thought best to remove the timbers and allow the roof to cave in.

Another danger which menaces the underground worker is that of gas. Coal gives off a gas that is easily ignited and gives rise to terrific explosions (see FIRE DAMP). In order to free mines from such impure air, rotary fans



are employed. They are placed near the shaft and are operated by machinery. They either drive fresh air into the workings or exhaust the foul air through pipes running to all parts of the mine.

The reader who imagines himself in an underground city with an orderly arrangement of streets and alleys—a wide main street with a number of narrower streets and still narrower alleys all leading to it—will have a fair idea of the average coal mine. The traffic conditions in the mine, however, are sometimes better than those of even large cities. Tracks are laid on all the chief avenues, as well as in many of the alleys, and issue ultimately upon the main street. Down these tracks the coal is hauled in trucks, which are linked together so as to form a train on the main track.

The trucks are hoisted up the shaft to a lofty wooden structure called the tipple, where the coal is weighed, sorted by being passed through screens of varying size and dumped into coal cars underneath.

Importance of Industry. In the mines and quarries of the United States over a million workers gain their livelihood. The capital invested was, according to the latest Federal census, $3,380,525,841, and the value of the product, $1,238,410,322. The most extensive operations are conducted in the Middle Atlantic states, where the industry amounts to almost thirty per cent of the whole. Pennsylvania is the leading state in the Union, the second being Illinois. The greatest value—$401,577,477—was the product of the mines putting bituminous, or soft, coal on the market; the value of

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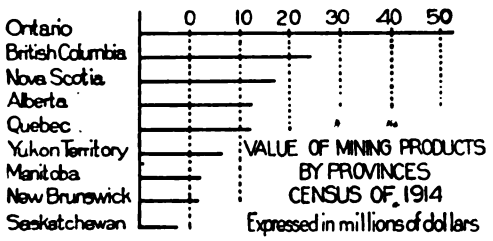
the anthracite, or hard coal, was $149,180,471. The iron mined was valued at $106,947,082, and the precious metals (gold and silver) at $94,-



123,180. In Canada the annual mineral production, in which coal leads, averages $120,000,000 to $140,000,000.

Consult Hoover's *Principles of Mining;* Kemp's *The Ore Deposits of the United States and Canada.*

Related Subjects. In the articles on the various countries, states and provinces there are subheads on mining or minerals which contain much statistical matter, and in the articles on most of the important minerals there is a discussion of the methods of mining (see, for example, COAL, subtitle *Coal Mining*). The reader is also referred to the following more general articles:

Assaying	Iron Age
Bronze Age	Metals (with list)
Fire Damp	Minerals and Mineralogy (with list)
Flux	Stone Age
Gems	
Geology	

MINISTERS, FOREIGN. See DIPLOMACY.

MINISTRY, *min'is tri,* a body of executive officers, heads of administrative departments of a government, who act in an advisory capacity to the head of the state, or direct the affairs of the nation. The term relates directly to the Cabinet as organized in Great Britain, the Dominion of Canada and the Commonwealth of Australia. While the United States adopted many of its fundamental principles of government from the British Constitution, including a modified form of the Ministry, no name for the body was authorized by the Federal Constitution, and, indeed, the American Cabinet as to-day constituted was not at first contemplated (see CABINET).

The English Ministry may contain as few as eleven members, or as many as nineteen, in ordinary times. During the War of the Nations other Ministerial posts were created, such as Minister of Munitions. The Ministry has for its head the Prime Minister, or Premier, appointed by the sovereign, and he serves until the country, in a general election, votes a lack of confidence in the policies he advocates. The entire Ministry then resigns, whereupon the ruler seeks another statesman more in harmony with the temper of the country, and he is invited to form a new Ministry. Each member of the English Ministry must be a member of the House of Commons; likewise, in the Dominion of Canada and in Australia, the Premier cannot appoint a Minister who has not secured election to the Parliament of the Dominion or Commonwealth.

The Ministers forming the Cabinets of England and Canada in ordinary times are the following:

England

Prime Minister and First Lord of the Treasury
Lord President of the Council
Lord High Chancellor
Secretary of State for Foreign Affairs
Secretary of State for India and Lord Privy Seal
Secretary of State for the Home Department
Secretary of State for the Colonies
Secretary of State for War
Chancellor of the Exchequer
First Lord of the Admiralty
Chief Secretary to the Lord-Lieutenant of Ireland
President of the Board of Trade
President of the Local Government Board
President of the Board of Education
Secretary for Scotland
President of the Board of Agriculture and Fisheries
Postmaster-General
Chancellor of the Duchy of Lancaster
First Commissioner of Works

Canada

Prime Minister
Minister of Trade and Commerce
Secretary of State
Minister of Justice and Attorney-General
Minister of Marine and Fisheries
Minister of Militia and Defense
Postmaster-General
Minister of Agriculture
Minister of Public Works
Minister of Finance
Minister of Railways and Canals
Minister of the Interior and Superintendent of Indian Affairs
Minister of Customs
Minister of Mines
Minister of Labor
Minister of Inland Revenue
Minister of the Naval Service
Ministers without Portfolio

MINK, a small, active, fur-bearing animal of the weasel family, inheriting the family characteristics of swiftness and agility. Equally at home on land or in water, the mink is never without a habitation. It is about two feet long, web-footed, has a bushy tail that is one-fourth of the length of the animal and a coat varying in color from light brown or tan to a dark chocolate. It lives in all parts of North America, in Europe and in Northern Asia.

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The mink of Northern regions is very valuable because of its fur, which has withstood the changeable dictates of fashion; beautiful and durable, it makes desirable apparel when converted into coats, hats, muffs, etc., and it is not imitated in inferior furs. The mink of Nova Scotia and that of the state of Maine produce the finest and glossiest fur. The darker specimens bring the highest prices; a muff of good quality costs $100 or more. The pelt must be secured early in the winter, before the playful little animal injures it by scrambling through holes and broken ice.

Minks have a fondness for the water courses, where food, consisting of frogs, fishes, etc., is plentiful, but mammals are not safe from their attacks when they wish to satisfy their hunger. The young, not more than four or five, are born in the spring in some hole among the rocks or in a hollow log, where they remain until winter. The mink has a strong, disagreeable odor, not so pronounced, however, as that of the skunk and rarely perceptible; at least it is not offensive to most people, except when the animal is in a rage. See FUR AND FUR TRADE; ANIMAL.

MINNEAPOLIS, *min e ap' o lis,* MINN., the county seat of Hennepin County, is the largest city in the state; the population in 1910 was 301,408; in 1915 it was 343,466. It is in the southeastern part of Minnesota, and is situated on both banks of the Mississippi River, 167 miles south and west of Duluth and 424 miles northwest of Chicago. Saint Paul, the state capital, situated on a northward bend of the river, is ten miles east of Minneapolis, and the two places, known as the "Twin Cities," have continuous suburbs and are connected by several interurban electric lines.

Three principal factors have contributed to the growth and development of Minneapolis as one of the great commercial centers of the northwest; these are Saint Anthony's Falls, which generate power for factories, a location near extensive grain fields and forests, and excellent shipping facilities. An enormous apron and concrete floor were built in the river in 1879 to prevent the threatened destruction of the falls by the wearing away of the original limestone ledge. A system of locks and dams, whose construction was begun in 1915, increases the work of the falls 40,000 horse power and makes the river navigable to the city. Railroad systems entering the city are the Chicago, Milwaukee & Saint Paul; Northern Pacific; Great Northern; Minneapolis, Saint Paul & Sault Ste. Marie; Chicago, Saint Paul, Minneapolis & Omaha; Chicago Great Western; Chicago, Rock Island & Pacific; Minneapolis & Saint Louis, and the Burlington Route. Five roads enter the Great Northern passenger station, or Union Depot; three enter the Chicago, Milwaukee & Saint Paul passenger station, and the Minneapolis & Saint Louis Railroad has its own station. Nearly twenty railway and highway bridges cross the river within the city limits.

The word *Minneapolis* combines the Indian word *minne,* meaning water, and the Greek word *polis,* meaning city. The extent of the city from north to south is ten miles, and from east to west, six miles; the estimated area is fifty-three square miles. The West Division, much the larger part of the city, is divided by the river from the East Division. The great mills of Minneapolis are grouped along the river near Saint Anthony's Falls. The principal business streets are Hennepin Avenue, Nicollet Avenue and First and Second avenues; many of the handsomest residences are along South Mount Curve and Clifton and Park avenues, in the southwest part of the city. All the streets are wide and, with the exception of a portion of the business district, run due east and west, north and south.

Parks and Boulevards. In developing a system of parks, Minneapolis has taken advantage of the unusual opportunities offered by a num-

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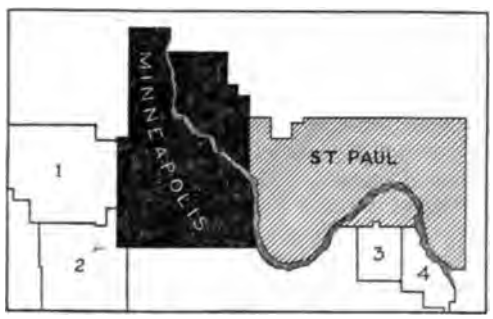
ber of natural lakes and the banks of the Mississippi. All of the parks, with a total area of 3,800 acres, are connected and intersected by boulevards fifty miles in extent. From Loring Park, near the center of population, Kenwood Parkway extends to a group of lakes, Cedar Lake, Lake of the Isles, Lake Calhoun and Lake Harriet, in the southwestern part of the city. Waterways for small craft, canoes, launches and sail boats connect these lakes, whose surrounding grounds (with the exception of Cedar Lake) form one large, continuous park. From Lake Harriet, the southmost of the group, the parkway extends southeast along Minnehaha Creek to Minnehaha Falls, a veil of water fifty feet high. The name *Minnehaha* has been immortalized in Longfellow's poem, *Hiawatha*. Here is a park of 142 acres, adjoining the grounds of the Minnesota State Soldiers' Home. Fort Snelling, a military reservation, the refuge of settlers in Indian war days, is south of Minnehaha Park. From this point a parkway extends north along each side of the river, on the west side to Riverside Park, one mile south of Saint Anthony's Falls, and on the east side to the state university campus. Throughout the city are a number of small parks. A short distance west of Minneapolis, reached by three railway lines, is an irregularly-outlined body of water, Lake Minnetonka, a delightful summer resort.

Public Buildings. One of the most conspicuous of the many handsome public buildings in



METROPOLITAN DISTRICT
(1) Saint Louis Park, village
(2) Edina, village
(3) West Saint Paul, city
(4) South Saint Paul, city

Minneapolis is the county courthouse and city hall, a large granite structure covering an entire block. It was erected by the county and city together, at a cost of $3,500,000. From its main tower, 345 feet high, may be had an excellent view of the city. Among other noteworthy structures are the new Federal building, which also covers an entire block, the Auditorium armory, the public library and branch buildings, Y. M. C. A. and Y. W. C. A. buildings, the Minneapolis Institute of Art, Corn Exchange, Lumber Exchange, the Great Northern depot and the Central high school. The prominent bank buildings include those of the Andrus, McKnight, Plymouth, Palace, Security and Soo First National banks; among the leading hotel buildings are the Radisson, Nicollet, Dyckman, Plaza and West; the Auditorium and Metropolitan are prominent theaters. Noteworthy churches are the Cathedral of Saint Mary, the First Baptist, the Wesley and the Fowler Methodist Episcopal, the Westminster Presbyterian, Plymouth Congregational and First Unitarian.

Institutions. The University of Minnesota (which see) occupies a beautiful campus on the east river bank. Institutions of collegiate rank in the city and vicinity are Augsburg Seminary (Lutheran), Minnesota College (Swedish), Hamline University (Methodist Episcopal) at Hamline, between Saint Paul and Minneapolis, and Macalister College (Presbyterian), at Macalister, a suburb between the two cities. Private schools include Stanley Hall, Graham Hall and Saint Margaret's Academy, girls' schools; and Blake School and De La Salle Institute, schools for boys. Dunwoody Institute, an institution maintained in part by the city, is a vocational school for boys.

Minneapolis has become widely known as an art center. The Minneapolis Symphony Orchestra, an organization including nearly 100 artists, is considered one of the leading institutions of its kind. In addition to the regular winter concerts in the city, given upon occasion in conjunction with the Philharmonic Club, a large choral society, the orchestra makes concert tours in the United States and Canada. The Art Institute building is one of the city's most distinguished structures. In it are permanent galleries and space for traveling exhibitions and the schoolrooms of the Minneapolis School of Arts. There are many private music and art schools, among them the Johnson School of Music, the Northwestern Conservatory of Music and the Handicraft Guild.

Among the leading hospitals are the Minneapolis City Hospital, Asbury Methodist, Northwestern, Saint Mary's and Saint Barnabas hospitals. In the city are a number of sanatoriums. The charities include the Catholic Orphans' Home; Washburn Home; Pillsbury House and

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other settlement houses, and a number of free dispensaries.

Industries. Minneapolis, called the "Flour City," leads the world in the manufacture of flour. The great mills, among them the largest single mill in the world, are grouped about the Falls of Saint Anthony, most of them on the west side of the river, within six blocks of the business center. The power of the falls, increased by successive dams across the river, the development of the extensive wheat fields of the northwest and the enterprise of the early millers secured for Minneapolis this great industry. The daily capacity of the mills is about 85,000 barrels, and the value of the annual output exceeds $90,000,000. Minneapolis is also the greatest single wheat market of the world. There are about fifty enormous grain elevators, with a combined storage capacity of 45,000,000 bushels.

With the gradual exhaustion of the pine forests of the north-central states the lumber industry is slightly decreasing, although the city is still one of the greatest lumber distributing points in the world. The great logs from the forests are floated down the Mississippi River and stopped by the booms near the mills. Cooperage, the manufacture of lumber products, furniture, interior finishings, the manufacture of breakfast foods, agricultural implements, boots and shoes, clothing, underwear, iron and steel products, linseed oil, paper, etc., are other extensive enterprises whose annual product, together with the output of flour and lumber, is worth more than $165,000,000. The wholesale houses of Minneapolis supply a vast outlying territory.

History. In 1860 the Falls of Saint Anthony were discovered and named by a Jesuit missionary, Father Hennepin (see HENNEPIN, LOUIS). In 1766 the place was visited by Jonathan Carver, who wrote in glowing terms of its natural beauty and commercial possibilities. By a treaty made between Lieutenant Zebulon Pike and the Sioux Indians, in 1807, the United States came into possession of a short strip of land along both banks of the river, which included Saint Anthony's Falls and the site of Minneapolis. Fort Snelling was built in 1819 by Colonel Leavenworth, under government commission, and in 1823 a mill was erected to furnish the fort with lumber and flour. Saint Anthony, a village on the east side of the river, settled in 1837, was platted and the first commercial sawmill built in 1848. A second settlement, begun in 1850 on the west side of the river, soon outgrew Saint Anthony and was incorporated as a town in 1856 and became the city of Minneapolis in 1867. Saint Anthony was annexed in 1872. In 1892 the Republican national convention met in the city. C.T.

Consult Parsons' *The Story of Minneapolis;* Hudson's *A Half-Century of Minneapolis.*

MINNEDOSA, *min e do' sah,* a town in southwestern Manitoba, the chief town of the northern judicial district. It is on the Little Saskatchewan River, which is not navigable, and on the Canadian Pacific Railway, on which it is a divisional point. It is 134 miles west of Winnipeg, seventy-nine miles west of Portage la Prairie and fifty-one miles north of Brandon by rail. Founded in 1883 by Edwin Oliver Denison (died 1915), it has gradually grown to importance, and is now an important distributing center. It has a number of large grain elevators, several lumber mills and other industrial plants, including the railway shops and the hydroelectric power plant. The armory, erected in 1912, the post office and customshouse, completed in the following year, and the courthouse are the most conspicuous structures. Population in 1911 was 1,483; in 1916, 1,831. G.T.T.

MINNESINGERS, *min' e sing erz,* the wandering minstrels of Germany in the twelfth and the thirteenth centuries. Highborn and courtly, as well as delightful entertainers, they were royally welcomed at the feudal castles to which their travels brought them. They wrote both poems and music, their lyrics relating chiefly to sentimental subjects. This gave rise to the name *minnesinger,* for *minne* is the Old German word for *love.* Many of their compositions, however, concerned religion, nature, patriotism, the Crusades and the political questions of the day.

One of the most brilliant of the minnesingers, Walther von der Vogelweide, was considered to have helped so greatly to awaken the German national spirit that the emperor rewarded him with a private estate. Longfellow wrote an interesting poem entitled *Walther von der Vogelweide,* and Wagner's opera of *Tannhäuser* is based in part upon an ancient legend about this beloved poet of early days. Wolfram von Eschenbach, another celebrated minnesinger, was the author of an epic called *Parzival,* the inspiration of Wagner's famous music-drama *Parsifal* (which see).

After 1300 the art of the minnesingers languished, but its revival was attempted by the mastersingers. See MASTERSINGERS.

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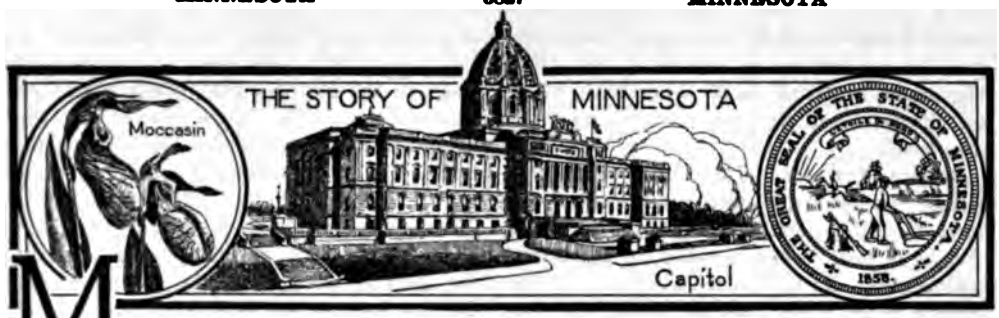

MINNESOTA, a great state in the north-central part of the American Union, tenth in size among the states. Its name, a Sioux Indian word, is poetic; it means *sky-tinted water*, or *cloudy water*. It is nicknamed THE GOPHER STATE from the little burrowing animal found there; but its more popular names are the BREAD AND BUTTER STATE, in reference to its wheat and its dairy products, and the NORTH STAR STATE, from its motto, the "Star of the North." As the state flower the moccasin flower, or lady's slipper, has been selected, a curious orchid which grows in the moist land about the many lakes.

Location and Size. The state lies just about at the geographical center of North America. To the north are the Canadian provinces of Manitoba and Ontario, to the east Lake Superior and Wisconsin, to the south is Iowa and to the west are North and South Dakota. Its boundary line is very irregular; on the west the Red River of the North makes up a large part of it; on the north is a chain of lakes and rivers, including Lake of the Woods, Rainy River, Rainy Lake and Pigeon River, and on the east Lake Superior and the Saint Croix and Mississippi rivers separate it from Wisconsin through almost its whole length. Although a great inland state, two-thirds of its boundary is water.

Minnesota has its greatest length from north to south, almost 400 miles, and an extreme breadth in its northern portion of 380 miles. Its total area is 84,642 square miles, Nevada and Idaho being the states nearest in size; but it differs from them in having a water surface of almost 3,500 square miles, consisting of about 7,000 small lakes varying from one mile to thirty miles in length. It is about one-third the size of the province of Manitoba, to the north.

The People. The state had, in 1910, a population of 2,075,708, slightly less than that of the city of Chicago. In number of inhabitants it ranks nineteenth among the states, but in its density of population, 25.7 to the square mile, twenty-eight states surpass it. As it is chiefly a farming state, more than half of the population live under rural conditions, only about forty per cent living in towns of 2,500 or more. Indeed, large cities are few, for in addition to Minneapolis, the largest city, and Saint Paul, the capital, only seven cities have a population that exceeds 10,000. These, in the order of their size, are Duluth, Winona, Hibbing, Virginia, Saint Cloud, Mankato and Stillwater. Each is treated in a separate article in these volumes.

OUTLINE MAP OF MINNESOTA
Showing boundaries, navigable rivers, principal cities, mineral deposits, largest lakes and the highest point of land in the state.

According to latest estimates there are a number of other cities approaching the 10,000 mark.

Minnesota has been one of the great immigrant states, and less than one-third of the inhabitants are native-born and of native parentage. Of the foreign-born whites, over forty per cent are Scandinavians, Swedes predominating slightly over Norwegians, and about

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twenty-five per cent are Germans. No other state so far east has as many Indians as has Minnesota, for living on its reservations, which are chiefly in the northern part, are no fewer than 9,050.

Surface Features. The most pronounced surface feature of this state, which has no towering mountains and no deep valleys, is the "height of land," as it is called, in the north-central part. Its very highest summit, in the Mesaba range, is but 2,400 feet above sea level, but no "great divide" in the world forms the watershed for greater rivers; for in addition to the Red River and the streams that feed the Saint Lawrence, there flows from its slopes the Mississippi, which, with the Missouri, is the longest system in the world. Not far from this highest land in the state is the lowest land, the coastal region about Lake Superior, which has an elevation of only 600 feet above sea level.

South and west, stretching across the state to the valley of the Red River, are rolling prairies, but these differ in some ways from the prairies of Illinois or of Kansas, for instance. Here and there they are interspersed with groves of hardwood trees, and in the southwest they are broken by the rounded hills which Longfellow in his *Hiawatha* calls "mountains of the prairie."

Waters. The greatest river system is that of the Mississippi, the "Father of Waters," which, with its tributaries, the Minnesota, the Saint Croix and various smaller streams, drains over half of the state, carrying the waters from this northerly region south to the Gulf of Mexico. The northwestern part of the state is drained by the Red River of the North and its tributaries, while the northeastern portion sends its waters through numerous short streams into Rainy River, or through the Saint Louis River into Lake Superior, and so on to the Saint Lawrence.

A glance at a map of Minnesota shows one striking peculiarity—its vast number of lakes. For the most part these are the result of the action of glaciers which long ago covered most of the northern part of the United States (see GLACIAL PERIOD); but some, as Traverse Lake, Big Stone Lake, Rainy Lake and Lake Pepin, are but widenings of river courses. In the north many of the lakes are deep, with rugged, rocky shores, but most of the southern lakes are comparatively broad and shallow. Whether in the north or in the south, however, many of the lakes are very beautiful, with their timbered shores and their clear, "sky-tinted" waters. The most famous of all is Lake Minnetonka, not far from Minneapolis, but the largest is Red Lake, in the northern part, which has an area of 340 square miles. Once upon a time there existed in the valley of the Red River a huge lake which at first drained southward toward the Gulf of Mexico and later northward into Hudson Bay, and it is the bottom of this old Lake Agassiz, as it is called, which constitutes the most fertile land in the state and which contain many of the smaller lakes of the present day.

Climate. The great advantage of the climate of Minnesota is the clear, dry air which makes endurable the extremes of temperature. The comparatively short summers often have very

A FEW OF MINNESOTA'S LAKES

hot days, and the long winters not infrequently show a temperature of thirty degrees below zero. It is not, however, mere local pride on the part of the people which makes them declare that the heat and cold are not felt as they are in regions of greater humidity. In fact, the climate on the whole is so healthful and so bracing that Minnesota is one of the favorite resort states in the Union.

Everywhere there is enough rain for successful agriculture, for while the average rainfall is but twenty inches in the northwest and thirty in the southeast, most of it occurs in the season when it is most needed. The northern part of the state has usually a sufficient snowfall to cover that section with snow during the greater part of the winter, and tobogganing is a favorite sport.

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Resources and Industries

Minerals. Minnesota has entirely within its borders the most valuable iron ore region, so far as known, in the world. This is the Mesaba Range, in Saint Louis County, which seems to contain an almost unlimited store of this most useful of the metals, and has been known to produce in a year the vast total of 38,000,000 tons. The Vermilion Range, near by, is also rich in iron ore, and the Cuyuna Range further southwest has been developed more recently. In all, Minnesota produces about two-thirds of the iron output of the country. Most fortunate is the location of these valuable mines, for they are not far from Lake Superior, and their yield is easily transported by water to the various Great Lake ports. Much of the growth of Duluth has been due to its iron-shipping industries.

All the other mine products of Minnesota amount in annual value to only a small fraction, sometimes only about one-sixteenth, of the iron yield. The most important of them are clays and building stones; among the latter, granites, sandstones and limestones are produced in considerable quantities. In the southwestern part of the state, in Pipestone County, there is a deposit of stone which is of peculiar interest. It is a red pipestone, found nowhere else in the United States in any quantities; and from it the Indians of these western regions for many centuries made their calumets (which see), or ceremonial pipes, which were smoked to ratify any important agreement.

Forests. Originally Minnesota was one of the most heavily-wooded of the states, and today, despite long-continued cutting, the forest area is still large. In the highland region of the north the evergreen forests are still almost as dense as in the olden days, and Minnesota produces more white-pine lumber than any other state; but the "Big Woods" of the Sioux Indians, that extensive forest of maples, oaks and other hardwood trees which stretched almost across the state just north of the center, has been very much thinned out. No other state makes so many laths as Minnesota, and among the manufactured articles the lumber and timber products rank second in importance.

There have been, at various times, disastrous forest fires which have swept great regions, and the loss to the state has been shown in the decreased output of lumber. In order to prevent such catastrophes as far as possible, strict forestry laws have been passed and the office of state forester has been created, but that these measures have not been entirely effective may be seen from the fact that there were in 1910 over 900 forest fires which swept over more than 1,000,000 acres of wooded land. Within recent years, however, these forest fires have been very greatly reduced.

Agriculture. This is the chief occupation of the people, and over fifty-three per cent of the land of the state is in farms. For the most part these are of considerable size, the average being 177 acres. It is an interesting fact that, according to the census of 1910, the foreign-born farmers outnumber the native-born by about 7,000.

The chief crops are the cereals, among which wheat ordinarily holds the first place both in acreage and value. Minnesota ranks second to North Dakota in the production of spring wheat. Oats and corn are of increasing importance, while in the production of barley Minnesota surpasses all the other states. The hay and forage crops make up about one-eighth of the total crop value, and potatoes and flaxseed are of considerable importance. Apples are grown successfully in the southern part of the state, and strawberries and raspberries are raised in large quantities in the neighborhood of Minneapolis and Saint Paul.

Though not one of the foremost live-stock states, Minnesota has a large number of cattle, and its dairy industries are of rapidly-increasing importance, amounting in a year to almost $40,000,000.

Game and Fish. Minnesota, once a paradise for the huntsman and the angler, is still the home of great numbers of prairie chickens, partridges and quails, and is visited by flocks of ducks, teal, geese and brants during their autumn journey southward from Canada. In the forest regions the deer, elk and moose are still found, and pelicans, gulls and other fish-catching birds seek a place of refuge in the islets of numerous lakes. Game is protected in the state by stringent laws, administered by the Game and Fish Commission. Perch, pike, bass, whitefish, sturgeon and lake trout are important game fish; the fisheries are replenished from the State Fish Hatchery at Saint Paul and the United States Hatchery at Duluth.

Manufacturing. The manufactures of the state depend almost entirely upon its own raw materials, and not, as in the case of Massachusetts, for instance, upon imported raw materials. A considerable proportion of iron ore is

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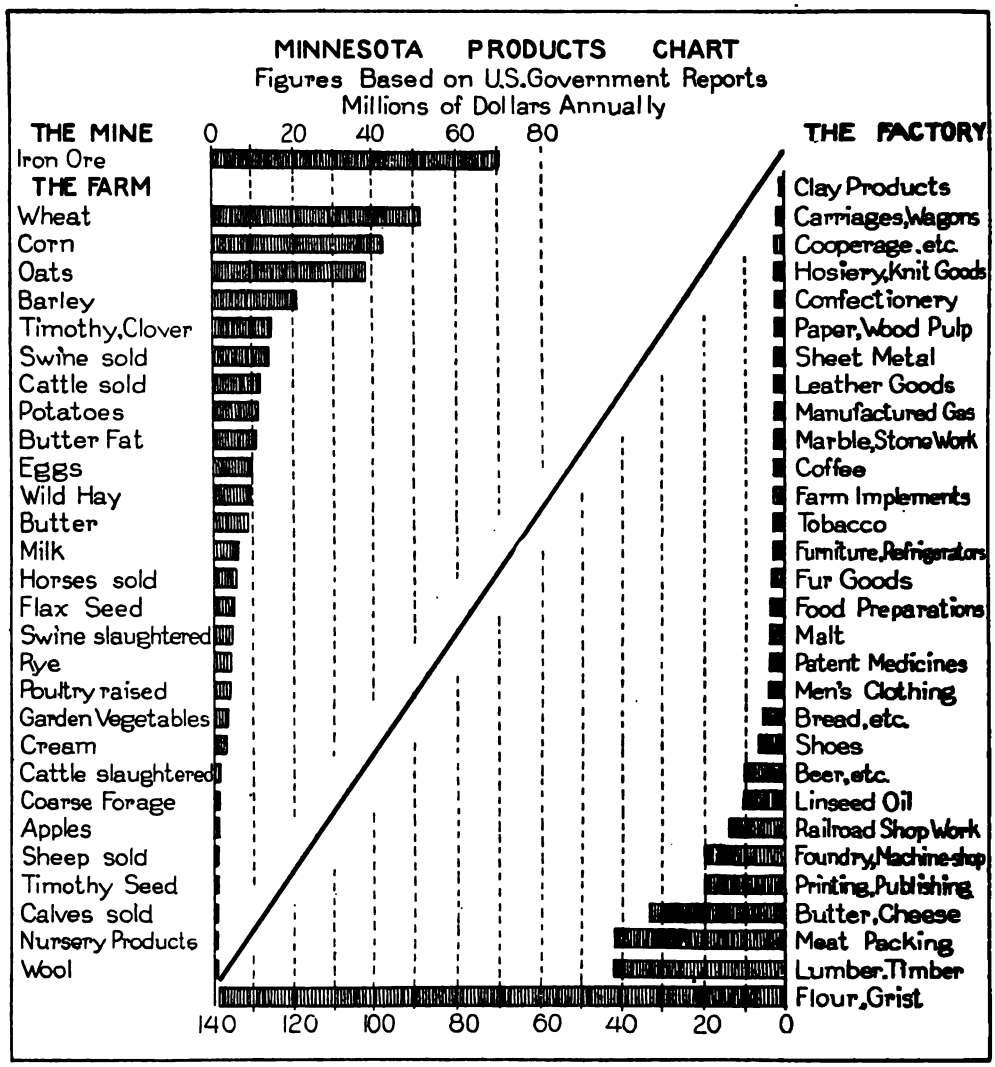

shipped in its original condition to Eastern markets, but great quantities are used in the ten-million-dollar plant which the United States Steel Corporation has erected at Duluth. There are, besides, vast wheat fields, millions of acres in extent, and thousands of miles of forest to provide material for local manufacture. No other state compares with Minnesota in the value of flour mill and gristmill products, over one-fifth of the flour produced in the United States coming from this one state. Minneapolis leads the world in its output of flour, the Falls of Saint Anthony furnishing it with an abundance of water power; but the industry is by no means confined to that city or to any one section of the state.

Second in value are the timber products (see *Forests*, above), and below these in value, but still of considerable importance, are the dairy products, the slaughtering and meat packing, foundry and machine-shop products, linseed oil and malt liquors. With a total value of manufactured products of almost $410,000,000, Minnesota ranks thirteenth among the states.

Transportation. Of water routes the state has an abundance. The Mississippi was very important in the early days of the state's history, but with the growth of railways its importance has declined. Not so with the Great Lakes, however, on which traffic from Minnesota grows heavier from year to year. Duluth, a small town but a few decades ago, is to-day

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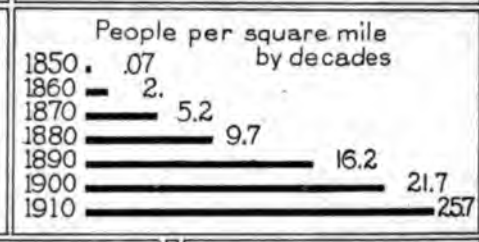
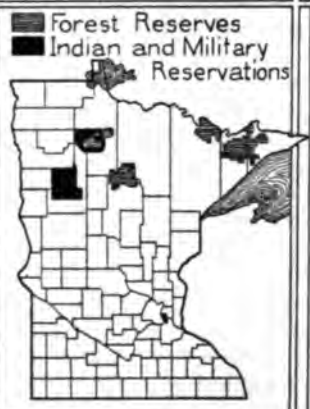
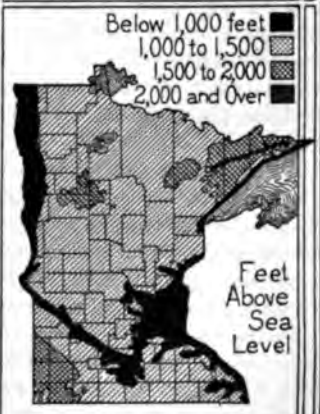
MINNESOTA







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the greatest port on the Great Lakes, rated by tonnage, and is one of the chief ports of the country; Two Harbors also has rapidly-growing shipping interests.

Save in the northern part of the state, where large regions are very thinly settled, railway facilities are good, and Minneapolis and Saint Paul, taken together, constitute the chief railroad center of the Northern Mississippi Valley. The aggregate mileage within the state is slightly more than 9,000, the Great Northern, the Chicago, Milwaukee & Saint Paul, the Northern Pacific and the Chicago & North Western possessing the largest part of that total.

Social and Political Conditions

Education. Like most of the other central states, Minnesota has taken a deep interest in education, and its system is in many ways particularly effective. The percentage of illiteracy is low, only three per cent of the people being unable to read and write; and were it not for the large proportion of rapidly-arriving foreign-born inhabitants the number would be far less, there being less than one-half of one per cent of the native-born whites who cannot read and write. The amount spent each year on education amounted in 1914 to $19,396,782. The permanent school fund, over $24,000,000, is the largest in the country and is steadily growing because of the tax on iron tonnage.

Minnesota's compulsory education law has features which distinguish it from the laws of most other states, for the upper age limit is not fourteen years of age, as is usual, but eighteen. At the head of the school system is a state superintendent of education; under him are county superintendents. There is also a state high school board which appoints school inspectors. To encourage high schools in giving industrial courses, the state makes generous annual grants to such as teach agriculture, manual training, home training and like practical subjects, and there are also special vocation schools. Special aid is also provided for normal and business training. There are five normal schools, at Winona, Mankato, Saint Cloud, Moorhead and Duluth, and they are well attended, for there is a state law which forbids any teacher to enter upon the profession without special normal training.

Highest of the institutions of learning is the University of Minnesota, at Minneapolis, one of the foremost universities of the country, and the largest in point of student enrolment. Other important institutions, most of them denominational, are Hamline University at Saint Paul, Gustavus Adolphus College at Saint Peter, Saint Olaf College and Carleton College at Northfield, Macalester College at Saint Paul, Saint John's University at Collegeville, and Saint Thomas College at Saint Paul. The last two, both Roman Catholic schools, admit no women. Several schools and colleges of a denominational character, for women only, are located in various parts of the state, and there are also a number of theological seminaries.

Religion. Owing to the large proportion of Scandinavians and Germans in the population, the Lutheran Church is especially strong, no other Protestant denomination having one-fifth as many members. The Roman Catholics, however, are even more numerous than the Lutherans, comprising more than two-fifths of the total church membership. Of the other sects the strongest are the Methodists, Presbyterians, Baptists and Congregationalists, in the order named.

Charities and Punishments. All the charitable and penal institutions have been, since 1901, under the supervision of a state board of control, which consists of three salaried members appointed by the governor every six years. The charitable institutions under the charge of this board include five hospitals for the insane, at Anoka, Hastings, Rochester, Fergus Falls and Saint Peter; the state public school for dependent and neglected children, at Owatonna; a tuberculosis sanatorium, at Walker; a hospital for crippled and deformed children, at Saint Paul, and schools for the blind, the deaf and the feeble-minded, all at Faribault. In 1912 there was established near Willmar a state hospital farm, where inebriates and drug victims are helped to free themselves from their habits.

In its penal institutions Minnesota has introduced some of the most advanced ideas. There is a state board of parole, and the indeterminate sentence is in operation for all crimes except murder and treason. Since 1911 capital punishment for murder has been forbidden by law, life imprisonment being substituted. The penal institutions include the penitentiary at Stillwater, housed in a modern building completed in 1914; a reformatory at Saint Cloud; an industrial school for boys at Red Wing and a home school for girls at Sauk Center. Until 1895 the convicts in the state prison were leased

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RESEARCH QUESTIONS ON MINNESOTA

(An Outline suitable for Minnesota will be found with the article "State.")

What are the "mountains of the prairie" and where are they located?

What has the state done to protect its forests?

What is the distinguishing feature of Minnesota's compulsory education law?

Why was it a greater sacrifice for Minnesota to send its men to the Federal armies during the War of Secession than for the older, more thickly settled states?

For what is Minnesota's highest land noted? Of what special importance is it as a "great divide," or watershed?

What and where were the "Big Woods" of the Sioux Indians?

Of what kind of lumber and of what timber product does Minnesota produce more than any other state?

What distinction has this state in regard to its permanent school fund? What important industry by its growth contributes to this?

Of how many other states or territories has this region formed a part?

What natural resources led the first explorers and settlers to this region?

How large a proportion of the inhabitants are native born and of native parents? What nationalities make up the greater part of its foreign-born population?

What mineral product of Minnesota is of special interest in connection with the early Indian inhabitants of the region?

How does the greatest port of the state rank among the ports of the Great Lakes?

How did it happen that not all the territory constituting this state came into the possession of the United States at the same time?

If the population of Minnesota and that of Chicago were exchanged, would the state be more or less densely populated than at present?

What is there peculiarly fortunate about the location of the great iron mines? How do they rank among the mines of the world?

Show how the manufacturing industries of the state are a natural outgrowth of the other industries and of the natural resources.

In what form will you not see tobacco on sale in Minnesota?

Has this state more or fewer lakes than Michigan? Than Florida? How were the most of the lakes formed?

What does the state name mean?

What is the great advantage of the Minnesota climate?

What does the state do to prevent its rivers and lakes from becoming empty of fish?

How large a proportion of the boundary of this state is water? How large is its water surface?

How many entire states of the Union have an area smaller than the water surface of Minnesota?

What was Lake Agassiz? How is its old area utilized now?

What gives Minnesota a right to the popular name of the "Bread and Butter" state?

How has the state shown its progressiveness in connection with its penal institutions? What is meant by an *indeterminate sentence?*

What is the difference in the way a murderer is punished in Minnesota and in New York?

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under contract to various companies, but since that time they have been employed in the prison, chiefly in the manufacture of binding twine and farm machinery. These industries, besides paying all the expenses in connection with the prison, as well as wages for the prisoners, which are sent to the families of the convicts, net the state a good profit.

Government. The constitution under which Minnesota is governed dates from 1857; a majority of all the members of both houses, as well as a majority of the voters at an election, is necessary to its amendment. At the head of the executive department is the governor. Other officers are the lieutenant-governor, secretary of state, treasurer, auditor and attorney-general, all elected for a term of two years, except the auditor, who holds office for four years. The veto power of the governor has been extended to separate items in the appropriation bills, and a two-thirds vote of both houses is necessary to pass any bill which the governor has vetoed.

The legislature consists of the usual two houses, a senate of sixty-three members, elected for four years, and a house of representatives of 119 members, elected for two years. The legislature meets in the odd-numbered years, and no session may be longer than ninety legislative days. No new bills may be introduced within the last twenty days of a session except by the governor's request.

The judicial department includes a supreme court of five justices, elected at large for a six-year term, and two commissioners appointed by the court itself; district courts, each with one or more judges, as the legislature may decide; and probate courts, one for each county. There are also justice courts which try petty cases and are presided over by justices of the peace.

Special Provisions. Minnesota has laws regulating the kind of employment in which children may engage, and the length of their working-day; a law forbidding the sale of cigarettes; minimum-wage laws, and a mothers' pension act. The liquor problem is in the county option stage—that is, the legal voters of any county may by a majority vote provide that no saloon license shall be issued therein. Women may vote only at school or library elections. See MINIMUM WAGE; MOTHERS' PENSIONS.

History of Minnesota

Discovery and Settlement. Minnesota is the old Ojibwa territory—the land where those legends grew up which Longfellow embodied in *Hiawatha;* but these were not the only Indians who lived there, for over the rolling prairies to the south roamed the Sioux. In 1678 the first European visited the territory. He was a Frenchman, Duluth by name, who built a fort on the north shore of Lake Superior, though not on the site of the city which now bears his name. Two years later the famous missionary-explorer, Hennepin, discovered the Falls of Saint Anthony, and word went out that the woods and the rivers of the territory held great treasures for the fur traders. By 1700 several posts had been established and the claim of the French to the region had been recognized. At the close of the French and Indian War in 1763 England received from France the title to the eastern part, and twenty years later transferred it to the United States, but the western portion was not acquired until 1803, when the United States bought from France the great territory of Louisiana (see LOUISIANA PURCHASE). Zebulon Pike explored the country in 1805, and then began an influx of settlers, but not until 1819 was the first permanent American settlement, the military post of Fort Snelling, established.

Territorial Years. The part of Minnesota east of the Mississippi was for a time part of the territory of Indiana, then, successively, of Michigan and of Wisconsin, but not until 1838 did the Indians finally cede their rights to the territory. Development, meanwhile, had been steady, though slow. A mill was built at the Falls of Saint Anthony in 1822, in the next year a steamboat ascended the Mississippi to the Falls, and in 1836 lumbering on a commercial scale was begun, great rafts of logs floating off down the river, guided by skilful logmen. In 1841 there was built, not far from the Falls of Saint Anthony, a little chapel—the Church of Saint Paul, it was called; and this was the beginning of the present capital city.

In 1849, when the region had a population of about 5,000, it was organized as the Territory of Minnesota, with boundaries stretching far west to the Missouri River, but all the western portion was still held by the Indians. In 1851 they ceded their rights to the lands west of the Mississippi, and settlers poured into the newly-opened region so fast that by 1860 there was a population of 172,023. Three years before this latter date, however, Minnesota was admitted to the Union as the thirty-second state, with its present boundaries.

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Growth as a State. Entirely apart from the region where slavery was a vital question, Minnesota was loyal to the Union during the War of Secession, furnishing about 25,000 men. But during that period it had a very serious problem of its own to solve, for while many of the strong young men were absent in the Federal armies, the Sioux Indians went on the warpath, attacking the frontier towns, killing over 600 white people and destroying nearly a million dollars' worth of property. Several hundred of the Indians were captured and brought to trial, and a number of them were hanged.

But all these Indian depredations could not intimidate the adventurous pioneers who had made up their minds to find homesteads in the fertile Minnesota region, and the new state grew rapidly. Railroads developed, towns sprang up, and emigrants flocked to this "far western country" from Europe, from those northern countries whose people make thrifty citizens. Occasional financial crises and disastrous forest fires, which destroyed villages and property and left hundreds of people homeless, were almost the only drawbacks to progress, and they proved but temporary. The discovery of iron ore about 1878 meant increased prosperity, but it was not until 1892 that the output from the wonderful Mesaba mines became so remarkable.

From the first years of its statehood until 1898 Minnesota was consistently Republican in politics, but since that date the Democrats have more than once been successful in electing their candidates. One Democratic governor, John A. Johnson, who first took office in 1905 and was twice reëlected, was especially popular, and gained a prominence in national affairs which brought him before the people as a possible candidate for the Presidential nomination of 1908. His death the following year ended an unusually promising career. In the election of 1912 Minnesota supported the national Progressive party headed by Theodore Roosevelt; in 1916 its Presidential vote was cast for Charles E. Hughes, Republican, by a plurality of 392 votes. A.O.R.

Consult Neill's *History of Minnesota;* Folwill's *Minnesota,* in American Commonwealths Series; Skinner's *Story of Minnesota.*

Related Subjects. The following articles in these volumes will be found to contain information that will be of interest in connection with a study of Minnesota:

CITIES

Duluth	Minneapolis
[illegible]	Red Wing
	Rochester
	Saint Cloud
	Saint Paul
	Stillwater
	Virginia
	Winona

HISTORY

Hennepin, Louis	Ojibwa
Hiawatha	Sioux
Louisiana Purchase	

LEADING PRODUCTS AND INDUSTRIES

Barley	Lumber
Dairying	Steel
Flour	Wheat
Iron	

RIVERS AND LAKES

Lake of the Woods	Rainy Lake
Minnesota River	Red River of the North
Mississippi River	Superior, Lake

MINNESOTA, UNIVERSITY OF, a coeducational institution which, in point of student enrolment, enjoyed, in 1916, the honor of being the largest state university in America. It was established by the territorial legislature of Minnesota in 1851, and was opened for instruction in 1869, at Minneapolis. The university maintains a graduate school; the college of science, literature and the arts; a college of engineering and architecture; the department of agriculture, including agriculture, forestry and home economics; schools of law and medicine, including a school for nurses; schools of mining and analytical and applied chemistry; the colleges of dentistry, pharmacy and education, and the extension department. Through the latter the people of the state may enjoy the advantages of correspondence courses, evening classes, lecture courses, field debates on public questions and a municipal reference bureau.

In 1884, when Dr. Cyrus Northrop became president of the university, it boasted one building and a student body of about 400. At the present time it is housed in over sixty buildings, which are located partly on the main campus, a stretch of land on the Mississippi River, comprising 109 acres and beautified by trees, lawns and walks; and partly on the university farm of 420 acres. On this farm are the buildings of the agricultural department and the main experiment station. The student enrolment is nearly 11,000, the faculty numbers about 650, and the university property is valued at over $12,000,000. There is a general library containing about 185,000 volumes and several special libraries.

In 1915 the university board of regents accepted from the eminent surgeons of Rochester, Minn., William J. and Charles H. Mayo, the facilities afforded by the Mayo Foundation, with the hospitals and laboratories under its control

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and with its endowment of $2,000,000, to be used for medical and scientific instruction and investigation, under the direction of the graduate school of the university. The University of Minnesota belongs in a very intimate way to the people of the state. Every effort is made to bring to all citizens who desire it the opportunity to secure educational dividends on their investment. G.E.V.

MINNESOTA RIVER, a river of the United States which joins the Mississippi between the cities of Minneapolis and Saint Paul, in the state of Minnesota. It rises in foothills of South Dakota known as the Coteau des Prairies, and flows southeastward to Big Stone Lake on the boundary between Dakota and Minnesota. At Ortonville the river leaves the lake, which is twenty-six miles long, and flows southeast to Mankato, Minn., where it abruptly bends towards the north, entering the "Father of Waters" a few miles below the Falls of Saint Anthony. Its total length is about 470 miles and its drainage area covers about 16,600 square miles. The chief affluents are the Chippewa, Pomme de Terre, Redwood, Cottonwood and Blue Earth rivers. It traverses a fertile prairie country, and during high water small vessels ascend it about 295 miles from its mouth. Large steamers traverse the first forty-five miles of its course.

MI'NOR, a musical term, for explanation of which see MUSIC; SCALE.

MINORCA, *mi nawr' ka,* the second largest and most easterly of the Balearic Islands, owned by Spain and lying east of that country, in the Mediterranean Sea. The area, including adjacent islets, is 293 square miles, nearly one-fourth that of Rhode Island. The surface is rough and mountainous and the coast very rugged. There are several good harbors; on the best of these is Port Mahon, the capital. The island contains a quantity of valuable minerals, including iron, copper, lead, marble, porphyry and alabaster. The chief products are oil, wine, hemp, flax, oranges, lemons, cheese and honey. The natives are good sailors, but are not industrious, and are quite illiterate. The island has been owned by the Carthaginians, Romans, Vandals and Moors, and in recent times has belonged to England and to Spain. At the Peace of Amiens, in 1802, it was ceded by Great Britain to Spain in exchange for Gibraltar. Population, 1910, 42,000.

MI'NOS. For more than two thousand years boys and girls have read or have been told the story of King Minos of Crete, who sacrificed Athenian youths and maidens to the Minotaur, a creature half man and half bull, in his labyrinth, and when the boys and girls have asked, "Is the story true?" they have been told, "It is only a myth, a made-up story of the ancient Greeks." In this twentieth century they can be told for the first time that Minos really did exist, that he really had a labyrinth, and that he held bullfights in which girls as well as boys faced the bull weaponless. All this has been discovered since 1900, through the excavations in Crete by Sir Arthur Evans.

There are many more legends of Minos, and it now seems probable that this name, like *Pharaoh* in Egypt, or *Caesar* in Rome, was given to each member of a long series of Cretan kings who swayed the Eastern Mediterranean from perhaps 2500 B.C. to about 1500 B.C. In mythology the legends all concern one man. He was the son of Zeus and Europa, and once in nine years he consulted with his father in a cave still to be seen on the mountain side. After his death he was made judge in the underworld. See CRETE; MINOTAUR.

A very interesting book about the modern discoveries is Baikie's *Sea Kings of Crete.*

MI'NOT, N. D., the county seat of Ward County, situated northwest of the geographical center of the state and on the Mouse River. Grand Forks is 206 miles east and south. Minot is the distributing center for a large territory, having the service of the Great Northern and the Minneapolis, Saint Paul & Sault Sainte Marie railroads. Its industry is centered chiefly in the mining of lignite coal and in making flour and briquettes; ample water power for manufacture is derived from the river, which at this point has a fall of ten feet. The city has a Federal building, a post office, the state normal school, a fine courthouse, a public library, and a large park through which the river winds its course. The government is administered on the commission plan. Population, 1910, 6,188.

MINOTAUR, *min' o tawr,* or **MINOS'S BULL,** was the monster with the head of a bull and the body of a man which, according to Greek mythology, belonged to King Minos. Once every nine years seven youths and seven maidens from Athens were sacrificed to it, but on the third occasion the hero Theseus killed the Minotaur and found his way out of the labyrinth by following a thread which Ariadne, the king's daughter, had given him. Thanks to the wonderful excavations begun in 1900 by Sir Arthur Evans, it is now known that there is an

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historical foundation for the story of the Minotaur. On the walls of the palace at Cnossus have been found pictures, painted 3,500 years ago, which represent girls and boys vaulting upon the back of a bull as it charges to gore them. Presumably these toreadors were trained from among captives, and from young people sent in tribute by Athens and other cities conquered by the Cretan fleets. The worship of a bull-headed god formed part of the early religion both in Crete and on the Grecian mainland.

HEAD OF THE MINOTAUR
A remarkable plaster relief discovered in 1900 on a wall of the palace of King Minos. It was executed nearly 3,500 years ago, in life size and in color. The eye has a yellow pupil and a red iris.

MINSK, the capital of a government in Russia of the same name, is situated on the Svislotch River, 468 miles southwest of Moscow. It has many good educational institutions, is the seat of the Orthodox and Roman Catholic bishops, and has cathedrals, theaters and a museum. The inhabitants are engaged in the manufacture of leather, hats, soap, woolen cloth, flour, tobacco, pottery and glass. Since the government proscription of the liquor trade, the result of the War of the Nations, the breweries and distilleries of Minsk have ceased to operate. In the city a fair is held in March of each year. Population, 1910, 105,400.

MIN'STREL, a word derived from the Latin *minister,* meaning a *servant,* is now generally applied to a class of poet musicians who flourished especially in the tenth and twelfth centuries. There was a division of classes among the minstrels, the appointed minstrel to the king or nobleman being considered above the wandering singers. The *scop,* as he was originally called, the minstrel who sang in the halls of great castles, generally made his own poetry and set it to the music of a harp. Minstrels were accorded the liberty of speech enjoyed by jesters, and were often treated as equals by their patrons, whose deeds and qualities they extolled in song. The rewards of minstrels were often large, pleased listeners bestowing on them jewels of great value.

The whereabouts of Richard Coeur de Lion are said to have been discovered by Blondel, his favorite minstrel, who wandered over Europe in search of him, and one day chanced to sing outside the castle in which Richard had been imprisoned by the Austrian emperor with whom he quarreled during the Crusades (see RICHARD I).

Modern Minstrelsy. Minstrels of the past fifty years blacken their faces and appear on the stage in group formation as colored people. They combine music, comedy, juggling and pantomime with other simple forms of entertainment. The first American traveling companies of this kind were the Christy Minstrels, who so quickly popularized Foster's *Suwanee River,* and the Virginia Minstrels, who at once made *Dixie* famous. The latter company, organized in 1843, is said to have been the first traveling minstrel entertainment in the world.

The greatest American minstrels doubtless were Primrose and West, who amused the world for twenty years. The leading twentieth century representative of this class of entertainers is Lew Dockstader. F.ST.A.

MINT, an institution where money is coined by the authority of the government. Originally individuals claimed the right to coin money, but the growth of commerce necessitated a uniform standard of values, and experience has shown the wisdom of delegating to the governments the exclusive right of making money. The United States mints are typical of all other mints.

THE MINT AT PHILADELPHIA
(For illustration of the Royal Mint at Ottawa, Canada, see page 1128.)

United States Mints. The first mint in the United States was established in Philadelphia by a national coinage act passed in 1792. Copper money was coined as early as 1792, silver in 1794 and gold in 1795. Because of the growth of population in the country, other mints became necessary, and there are now three; the others are located at Denver and San Francisco. The mints and all the assay offices are under

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the supervision of the director of the mint, who is appointed by the President and is responsible to the Secretary of the Treasury. For description of an assay office and the location of America's assay offices, see ASSAYING, subhead *Assay Office*.

In Other Countries. The coining of the greater part of English money in London dates back to the time of William the Conqueror. The present mint on Tower Hill in London was established between 1810 and 1815. This mint supplies all the coinage for the British Empire except Australia and the East Indies, which are supplied by branch mints at Sydney, Melbourne and Perth. A fourth branch is located at Ottawa in Canada, and it produces the supply of Canadian coins and English sovereigns (see CANADA, page 1128). Only one mint is usually found in each of the countries of Europe. Mexico's national mint is in the City of Mexico. Africa has none. South America has four mints, at Buenos Aires, Santiago, Lima and Tegucigalpa, but most of the South American coinage is manufactured in Europe by contract.

For process of coining money, see COINAGE. For different coins now in use, see MONEY.

MINT, a family of plants which, according to one of the old myths, were named for Mentha or Mintha, a beautiful rival of Proserpina, whom the latter, in a jealous rage, turned into a plant. This group of herbs, distributed over almost all parts of the world, is characterized by its creeping rootstocks, square stems bearing opposite, pleasant-smelling leaves, and spikes of small, bluish or pinkish two-lipped blossoms. Probably the best-known species are peppermint (which see), much used as flavoring for candy and medicines, and *spearmint*, sometimes called *garden* or *mackerel* mint, employed as a flavor in cookery and chewing gum. From the lemon-scented leaves of *bergamot mint* comes a fragrant oil, a common ingredient of perfume, while dried *curled mint*, widely cultivated in Germany, is used medicinally for poultices and warm baths. Other species are *wild* or *brook* mint, resembling pennyroyal, and *stone, sweet* or *horse mint*.

MIN'TO, GILBERT JOHN MURRAY KYNYNMOND ELLIOT, Fourth Earl of (1847-1914), a British soldier and statesman, Governor-General of Canada from 1898 to 1904 and Viceroy of India from 1905 to 1910. Lord Minto was educated at Eton and at Trinity College, Cambridge, and immediately after his graduation in 1867 entered the Scots Guards as an ensign. He resigned from the army in 1870. During the Carlist Insurrection in Spain he accompanied the revolutionists, then served with the Turkish army in 1877 in the Russo-Turkish War, and in the second Afghan War was private secretary to Lord Roberts. From 1883 to 1885 he was military secretary to the Marquis of Lansdowne, then Governor-General of Canada, and was also chief-of-staff to General Middleton during the Saskatchewan Rebellion. In 1898 he returned to Canada as Governor - General, succeeding the Earl of Aberdeen. He remained in Canada until 1904, and from 1905 to 1910 was Viceroy of India in succession to the Earl of Curzon. It is an interesting coincidence that Lord Minto's great-grandfather, the first earl (1751-1814) was Governor-General of India from 1807 to 1813.

EARL OF MINTO

MINUIT, *min'u it*, PETER (1580-1641), a colonial governor of New Netherland, born at Wesel, Rhenish Prussia, who was noted for his determination, skill and energy. In 1625 he was appointed governor and director-general of New Netherland by the Dutch West India Company, and in 1626 he purchased Manhattan Islands from the Indians for sixty guilders, or about twenty-four dollars. He later built Fort Amsterdam. In 1631 he was recalled, but soon returned to America and built Fort Christiana, near the present city of Wilmington, Del., under the auspices of the Swedish West India Company.

MINUTE, *min'it*, a division of space and also of time. The ancient Babylonians used the sexagesimal system of notation; that is, they figured by sixes and sixties instead of tens and hundreds, as in the decimal system, now universally employed. As the Babylonian year had 360 days, the astronomers, in making their computations, divided the circle into 360 parts, each of which is now called a degree. A degree is divided into sixty parts, and each of these parts again divided into sixty smaller parts. When the Romans adopted the Babylonian system of division they called the parts of a degree the *partes minutae primae*, or *first small parts*, and the divisions of the first small parts became the *partes minutae secundae*, or *second*

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small parts. In the course of time these phrases were each shortened to one word, *minutae* and *secundae;* in English these words became *minute* and *second.* At first used only in geometry and astronomy, the close relation of astronomy to chronology led to their use in measuring time. Thus the sixtieth part of an hour became a minute, and the sixtieth part of a minute became a second. See CHRONOLOGY.

MINUTEMEN, *min'it men,* the name given a class of volunteer militiamen who hold themselves ready for service at short notice. The term was specifically applied during the early period of the American Revolution, the men being ready for instant service whenever summoned. The minutemen were principally residents of Massachusetts who were enrolled according to an act passed November 23, 1774, by the Provincial Congress, and numbered about 16,000. Lowell, in *Among My Books,* said: "It was the drums of Naseby and Dunbar that gathered the minutemen on Lexington Common."

MIOCENE, *mi'o seen,* **PERIOD,** a division of the Cenozoic Era extending from the Eocene to the Pliocene Period. The rock formations of this period along the Atlantic coast of North America extend from Marthas Vineyard southward, and around the Gulf of Mexico. They consist chiefly of sand, sandstone, shell marl, and, in some localities, earths containing diatoms, such as Bermuda earth and Tripoli, which render them valuable for polishing purposes. The life along this coast indicates that the climate may have been cooler than at present. On the Pacific coast the Miocene formations are of slight importance. They occur in various places in California, and consist of shales and sandstones. In this period representatives of the highest order of mammals (the primates) made their appearance.

Related Subjects. The reader is referred to the following articles in these volumes:

Cenozoic Era	Geology (for diagram)
Eocene Period	Pliocene Period

MIQUELON, *me'k' lawN,* **ISLAND,** near the southeastern coast of Newfoundland, at the entrance to Fortune Bay, has an area of 83 square miles. The southern part, which was formerly separate but is now connected with the northern part by a sand bank, is called *Little Miquelon,* or Lungly Island. The island forms part of the French colony of Saint Pierre, having been in the possession of France since 1763, and now the only French territory in America remaining of all its former vast possessions. It is governed by the commandant of Saint Pierre and is occupied by a few families engaged in the fisheries. The total population numbers about 600.

MIRABEAU, *me ra bo',* GABRIEL HONORÉ RIQUETI, Count de (1749-1791), a French statesman, orator and revolutionary leader, often called "the tribune of the people," because he was bold in making demands in their interest. He was born at Bignon, and entered a military school in Paris in 1767. The same year he joined the Berry cavalry regiment, was imprisoned for misconduct on the island of Re, but was released on condition that he would join the Corsican expedition in 1769; this he did and in 1771 was commissioned captain of dragoons. For some time later he lived in Holland and in England, but returned to France in 1788 and was elected by the Third Estate to represent Aix in the States-General, or National Assembly.

MIRABEAU

Although he was always in debt and lived a dissolute private life, his wonderful powers of oratory soon made him one of the most important public figures of France. He early became identified with the French Revolution, and he attempted to place his abilities at the king's service and to work with Lafayette and Necker. He was viewed with suspicion, however, because of his character. In 1790 he became president of the Jacobin Club, and in 1791 was elected president of the National Assembly, a position which he coveted. He died three months afterward, his last words, with prophetic insight, being "I carry with me the ruin of the monarchy."

MIRACLE, *mir'a k'l,* a sign or mighty wonder performed to show the power of God, but only employed in a great cause or for a religious purpose. The miracles of the Bible were confined almost exclusively to four periods, which were widely separated. The first was during the return of the Children of Israel to Canaan under the leadership of Moses and Joshua; the second, during the struggle between Christianity and heathenism under Elijah and Elisha; the third, during the Exile in Babylon;

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and the fourth, at the time when Jesus was on earth. They were unusual events, such as the dividing of the waters in the Jordan to allow the Children of Israel to cross, or the feeding of the five thousand with five loaves and two fishes, and all were intended to show divine authority. Thus people were often reassured or aided in their faltering faith in God, and thus miracles helped in establishing the kingdom of God on earth.

MIRACLE PLAY, a religious play or drama founded on subjects taken from lives of the saints or from Scripture narratives which were popular in England during the Middle Ages. These dramas were shown to the people at certain times of the year and reached their height of popularity in the thirteenth century, during the time of Chaucer. The institution of Corpus Christi Day, with its elaborate ceremonies and processions, gave a great impetus to these plays. They passed into the hands of tradesmen's associations or guilds after leaving the churches, as by Papal edict clerics, or those under holy orders, were forbidden to appear on the stage. The plays continued to be given until the reign of Elizabeth, when they ceased to have vital interest, but their influence was great in preparing the way for a more modern drama. Very few texts of these miracle plays have been preserved, but in structure and aim they were similar to the mystery plays (which see).

MIRAGE, *me rahzh'*. During the first invasion of Egypt by the army of Napoleon, in 1789, the soldiers were frequently annoyed by deceptive appearance of cool lakes across the shimmering expanse of heated desert air. One of the members of the expedition, a French mathematician named Gaspard Monge, gave what is supposed to be the first scientific explanation of this phenomenon, to which the name *mirage,* from the Latin word *mirari,* meaning *to wonder,* has been aptly applied.

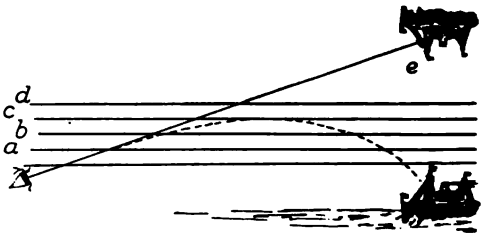
It often happens in deserts that the air near the surface of the sand becomes abnormally heated, so there is a well-defined bounding surface between the lower strata and the cooler, denser layers of air above; this bounding surface acts like a reflecting mirror, in which objects appear inverted. A cloud or portion of sky, for instance, may be so reflected by this natural mirror that it will look exactly like a body of water lying on the sands of the desert. Since the reflecting surface often varies in position, owing to the constant addition of heat waves to the upper strata of air, the reflected cloud or bit of sky will seem to be a lake whose waters are being stirred by the wind.

A common type of mirage is that in which trees are seen in an inverted position, as if reflected in a body of water. The ray from a tree top coming obliquely downward may be so bent from its first direction as it passes through the different layers of air that it is sent obliquely upward to the eye, but the eye follows the ray back in a straight line. The low, hot stratum of air serves as a reflecting mirror, and the observer imagines he sees in the distance a green oasis.

MIRAGE IN THE DESERT

Let it be supposed that the air strata decrease in density from *a* to *d;* a ray of light coming from an object (the tree) will be refracted in passing downward through the stratum *a,* still more in passing through *b,* and so on until it penetrates a stratum which may be *d,* where the ray is totally reflected. The direction of the ray will then be upward, but will be refracted toward the perpendicular as it passes through strata of increasing density, so when the ray reaches the eye the object will appear in the direction of *e.*

Mirages are also observed at sea, but in this case the denser layers of air are next to the surface of the water, and the reflected object seems to be suspended in the sky and inverted. The accompanying drawings show the direction taken by rays of light passing through layers of air of different densities, producing in one case mirage of the desert, and in the other mirage of the sea.



MIRAGE OVER THE WATER

Air is denser near the surface of the water than it is at higher altitudes, because the water cools it. The course of the rays is shown in the illustration. A vessel so far distant as to be hidden by the curvature of the earth will appear above the horizon when the rays of light are at first refracted from the perpendicular until the lighter stratum is reached at *d,* when total reflection takes place. By this the ray is given an inclination downward, so the object appears in the direction of *e.*

The *Fata Morgana (fah'tah mawr gah'nah)* is a form of complicated mirage occasionally observed in the Strait of Messina. It was so

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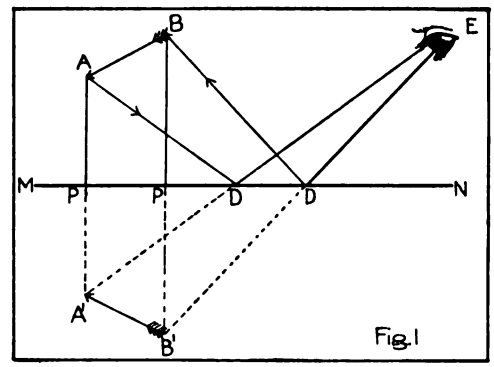
named because of the legend that it was the work of a fairy of the same name in medieval romances. C.R.M.

MIRAMICHI RIVER, *mir ah mi shee'*, the largest river in New Brunswick, except the Saint John. It is a small stream, for it is only 135 miles long from its mouth to the headwaters of its principal tributary. The Miramichi is famous, not for its size but for its fish; it is one of the greatest salmon streams of the world, and is visited every year by hundreds of sportsmen. The whole Miramichi basin, which covers a little more than 5,000 square miles, is in fact a paradise for hunters. It has never been thoroughly explored, and moose, caribou, deer, bears, wolves, foxes and many smaller animals range the forests. In some sections the advance of the lumberman, however, has driven away the game. Pine woods line the banks of the river and its tributaries, and lumbering is now an important industry.

From its mouth in Miramichi Bay, an arm of the Gulf of Saint Lawrence, the river is navigable for large vessels as far as Newcastle, a distance of thirty miles. Up to this point it is practically an arm of the sea. About five miles above Newcastle the river proper comes to an end, and divides into the Northwest Miramichi and the Southwest Miramichi. The latter is the head stream, some of its numerous branches extending within a few miles of the Saint John River, in the western part of the province. By short portages between these branches and the tributaries of the Restigouche and the Saint John the Indians could reach any part of the present province in their canoes. The same possibility exists to-day for the sportsman and camper. H.V.B.

MIRROR, *mir'er*. Every person makes daily use of a mirror or looking-glass. Any smooth surface which is capable of reflecting the rays of light that fall upon it is a mirror. The ordinary looking-glass is a pane of glass coated on the back with a layer of silver or mercury. Mirrors are used not only for household and decorative purposes, but also in a great number of scientific and other instruments, such as microscopes, telescopes, searchlights, and the like. The action of the mirror is based on the general laws of reflection of light, which are: (1) the incident rays, the normal and the reflected rays are all in one plane; (2) the angle of incidence is always equal to the angle of reflection.

The mirrors used in our houses or public places are *plane* mirrors, that is, mirrors having plane surfaces. When you stand before such a mirror, your image is of the same size as yourself, and appears as far behind the glass as you are in front of it. The image is, however, reversed. Thus, when you raise your right hand, it appears to raise its left hand. Let us see how images are formed in a plane mirror. In Fig. 1



Construction of an image in a plane mirror.

let MN represent the mirror and AB the object. An observer placed at E will see the image $A'B'$ situated behind the mirror. That image is formed in the following way: From the point A rays of light are sent out in all directions. Some of these strike the mirror at the point D and are reflected towards DE. To the observer at E the point will appear to lie in the direction EDA'. Other rays will strike the mirror perpendicularly at the point P and will be reflected back in the direction PA. To an observer at E the point A will appear to lie along the line APA'. The image of A will therefore be found at the intersection of these two lines, that is at A'. In the same way the image of B will be formed at B', and those of all the intermediate points between A and B will lie between A' and B'.

A *concave* mirror is a portion of the inner side of a sphere. The center of the sphere, of which the mirror is a portion, is called the center of curvature. The line connecting the middle of the mirror with the center of curvature is called the principal axis. Any straight line from the mirror through the center of curvature is called a secondary axis. When rays of light parallel to the principal axis strike a concave mirror, they are reflected in such a way that they meet at a single point, called the principal focus. The principal focus is situated on the principal axis, halfway between the mirror and its center of curvature. Let us see how an image is formed in a concave mirror. In Fig. 2 let MN be the concave mirror, and AB the object. The line PC is the principal

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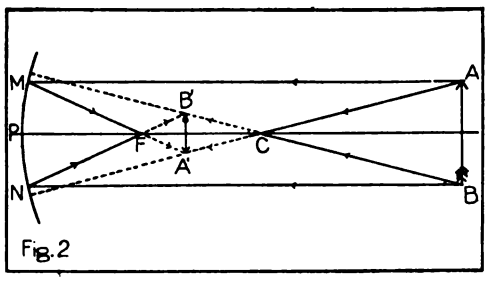
axis, and a ray of light from *A* striking the mirror at *M*, parallel with the principal axis, is reflected at the principal focus *F*. The line *MF* must contain the image of *A*. Another ray from *A* passing through the center of curvature

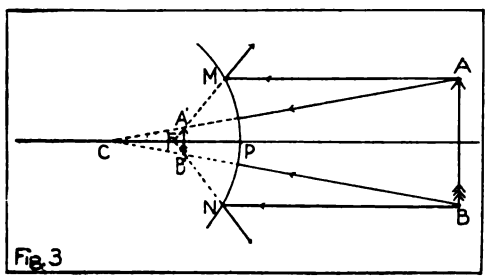


Construction of an image in a concave mirror. The object is beyond the center of curvature of the mirror.

and striking the mirror is reflected back along the same path, *CA;* this line also contains the image of *A*. The image is, therefore, found at the intersection of those two lines, namely at *A'*. In the same way the image of *B* will be formed at *B'*. We see that the image is smaller than the object, inverted, and real.

In the example shown in Fig. 2 the object was beyond the center of curvature. When the object is situated between the center of curvature and the principal focus the image formed is larger than the object, inverted and real, and appears beyond the center of curvature. Reflectors for carriage lamps, bicycle lanterns, hand shaving mirrors, mouth mirrors used by dentists, all contain concave mirrors.

A *convex* mirror is a portion of the outer side of a sphere. The image is formed in the same way as in the concave mirror, but as the center of curvature and the principal focus are behind the mirror, the reflected rays have to be ex-



Construction of an image in a convex mirror.

tended also behind the mirror in order to meet these points and to form the image. The image formed in convex mirrors is always behind the mirror, smaller than the object, erect and virtual. A polished ball reflects such an image.

The still waters of ponds and lakes were the only mirrors known to primitive man. The ancient peoples, the Egyptians, the Hebrews, the Greeks and the Romans, used mirrors made of polished metals, such as brass, bronze, silver and gold, and various alloys. Mirrors of glass were first made at Venice at the beginning of the fourteenth century. It was not until 1673 that the making of mirrors was started in England. Mirrors are coated on the back with a metallic covering. Formerly this coating consisted of an amalgam of tin and mercury; now silver is used. The silvering is protected by a coat of shellac varnish and on top of this by another coat of varnish that contains red lead.

Heat, as well as light, is reflected from a mirror, and a concave mirror can be used to bring the rays of heat to a focus. Objects can thus be set on fire or melted from a distance by means of reflectors that concentrate the rays of heat upon them. The most famous feat of this kind known in history is that attributed to the Greek mathematician *Archimedes*, accomplished during the siege of Syracuse in 213 B.C. It is said that Archimedes burnt the Roman fleet, or a part of it, by employing a set of concave mirrors which focused the rays of the sun upon the Roman ships in the harbor. C.R.M.

MISDEMEANOR, *mis de meen' er,* an offense of a less serious nature than a felony. Among the offenses so classed are assault and battery, malicious mischief and acts which make the offender a public nuisance. The laws of various countries, states and provinces differ, however, in defining such offenses, and what is a misdemeanor in one state may be classed as felony in another. Misdemeanors are usually punishable by fine or brief jail imprisonment.

MISHAWAKA, *mish a waw' ka,* IND., a manufacturing city, situated in the extreme northern part of the state, about midway between its eastern and western borders, and on the Saint Joseph River. By rail South Bend is four miles west, and Chicago is ninety miles northwest. The Lake Shore & Michigan Southern and the Grand Trunk railroads serve the city; there is also connection with the larger cities of the state by interurban lines. Belgians predominate in the foreign element of the population, which increased from 11,886 in 1910 to 16,385 in 1916 (Federal estimate). The city has an area of nearly four square miles.

Mishawaka has a variety of industrial establishments. Abundant water power is provided for manufactories by the Saint Joseph River, which at this point is spanned by three con-

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crete bridges. About 5,000 people are employed in the three most prominent plants, whose products are wool boots, rubber goods, heavy machinery and water softener; windmills, furniture, church organs and launches are also extensively manufactured. Among the notable buildings are the Federal building, city hall, the $100,000 high school, the Methodist Episcopal church, erected at a cost of $200,000, and the Carnegie Library.

Mishawaka is one of the oldest cities in Northern Indiana. It was settled in 1828 and incorporated in 1834 as Saint Joseph Iron Works. The change of name was authorized by a special act of the legislature. *Mishawaka* was the name of an Indian chief. F.A.P.

MISSAL, *mis'al,* the book which contains the prayers and complete yearly service for the celebration of mass in the Roman Catholic Church, the name being derived from *missa,* meaning the *mass.* It was formed by uniting the separate books used in the service into one volume. In order to correct variations the Council of Trent ordered its revision, which was done by Pope Pius V in 1570, and its use was commanded in all churches which failed to show that its service book, or ritual, had been in unbroken use for two hundred years. Subsequent revisions were made in 1604 by Pope Clement VIII, and by Urban VIII thirty years later. Pope Leo XIII also made slight revisions regarding the rules in 1884 and in 1898.

MISSIONARY RIDGE, BATTLE OF. See CHATTANOOGA, BATTLE OF.

MISSIONS AND MISSIONARIES, *mish unz, mish'un a riz.* It is through its missions and the consecrated workers who make them possible that the Christian Church is attempting to carry the gospel to all peoples. The immediate followers of Jesus became the first missionaries of earth. Paul is known as the great missionary to the Gentiles, and the work inaugurated by him and continued by his successors resulted, by the middle of the fourth century, in bringing the entire Roman Empire under Christian rule.

The second great missionary task was the conversion of Northern Europe, and this absorbed the energies of the Church for a thousand years. Illustrious names of this epoch are those of Ulfilas, the Apostle to the Goths; Patrick, missionary to Ireland, Columba, who carried the gospel to Scotland, and Augustine, the first Archbishop of Canterbury. Germany's early apostle was Boniface, who courageously attacked its pagan practices by cutting down the ancient oak that had for centuries been the place of sacrifice to the terrible god Thor. Ansgar, in the extremity of heroism, carried the gospel to the untamed Scandinavians, and Vladimir braved death to preach to the early Russian tribes.

The method of the missionaries of this era was to convert the kings from heathenism and then to baptize all of their subjects, the work of education naturally taking centuries to complete. As late as the thirteenth century several Slavic tribes still offered human sacrifice, and the people of Lapland and other far Northern regions were not brought to a knowledge of Christianity until after the Protestant Reformation.

Missionary effort in all lands received a new impulse at the beginning of the modern era of discovery and invention. Columbus and other pioneers of exploration were inspired in no small measure by their desire to evangelize the inhabitants of the lands beyond the seas. The Roman Catholic Church commissioned such men as the celebrated Xavier, who in the fifteenth century planted missions in India, China and Japan, and in the centuries following sent out devoted bands of Franciscans, Dominicans and Jesuits, who penetrated every part of the known world. The Catholic Society for the Propagation of the Faith, organized in 1822, still has complete control of the missionary activities of the Church.

Protestant Missions. The modern movement of Protestant missionary effort began in 1793 with the sending of William Carey from England to India. Robert Morrison landed in China in 1807, and Adoniram Judson was sent from America to Burma in 1813. A band of heroic souls early devoted themselves to the work in the South Sea Islands. Africa, long known as the Dark Continent, was opened to Christian influences through the heroism of David Livingstone, missionary and explorer. Japan, which had long before expelled Roman Catholic missionaries, was entered by Protestants after Perry, in 1853, had negotiated his epoch-making treaty with that country. Korea (now Chosen) received its first missionaries in 1885.

The method of the Protestant missionary is to go among non-Christian peoples, not primarily as a priest, but as a man and the head of a family, establishing a center for the social transformation of the community. Beginning with the founding of a home, he follows with church, school and hospital, preparing the way

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for a general advance of the people through the scientific and commercial, as well as the moral and religious, benefits of Christian civilization. Protestant missionaries work under the direction of and are supported by their various Church boards, but aim, as rapidly as possible, to make the native churches self-supporting. Their success is illustrated by the financial report for 1914: though the American Protestant contributions to work in foreign lands amounted to seventeen millions of dollars, the native converts in their missions gave a sum equal to one-fourth of that amount. M.A.H.

Related Subjects. The following missionaries are given special treatment in these volumes:

Augustine, Saint	Livingstone, David
Boniface, Saint	Marquette, Jacques
Edwards, Jonathan	Patrick, Saint
Eliot, John	Paul, Saint
Grenfell, Wilfred T.	Smet, Peter John de
Hennepin, Louis	Whitman, Marcus
Joliet, Louis	Wilson, John
Judson, Adoniram	Xavier, Francisco

THE STORY OF MISSISSIPPI

MISSISSIPPI, *mis i sip' i*, popularly known as the BAYOU STATE, a south-central state of the American Union, and one of the Gulf states, named after the mighty river that borders it on the west. This name is derived from two Indian words, *missi sepe*, which mean *great river*, or, literally, *father of waters*. As its flower, Mississippi has chosen the magnolia.

Size and Location. Mississippi, with an area of 46,665 square miles, of which 303 square miles are water, ranks thirty-first among the states in size. The state nearest to it in area is Pennsylvania. Its extreme length from north to south is 330 miles; its extreme width is 188 miles, and its average width is about 150 miles. It has a coast line of eighty-five miles. In addition to the mainland Mississippi includes a number of islands, namely, Ship Horn, Cat, Petit Bois and others, lying in the Mississippi Sound.

Its People. With 1,797,114 inhabitants in 1910, Mississippi ranks twenty-first among the states. The estimated population January 1, 1917, was 1,964,122. It has an average of about 41.5 persons to the square mile. In the period from 1900 to 1910 it increased its population by 245,844, a gain of 15.8 per cent. This is about the rate of increase shown by all the Southern states with large negro populations. Of the population in 1910, 43.7 per cent were whites, 56.2 per cent were negroes, as against 41.3 per cent whites and 58.5 per cent negroes in 1900. Mississippi has a larger percentage of negro population than any other state in the Union, but the state that has the largest number of negroes is Georgia. The foreign-born population, as in all other Southern states, is very small, numbering only 0.5 per cent of the total population.

By far the greatest number of the people of the state live under rural conditions. Only 11.5 per cent (7.7 per cent in 1900) live in towns of 2,500 inhabitants or more. The principal cities in the state are Jackson, the capital; Meridian, Vicksburg, Natchez, Hattiesburg, Greenville, Columbus, Biloxi, Laurel, Yazoo, Gulfport, McComb, Greenwood, Brookhaven and Corinth. The most important of these are described under their titles in these volumes.

Their Religion. Over half of the people of the state are Baptists, and about thirty per cent are Methodists. The remainder are mainly Roman Catholics, Presbyterians, Disciples of Christ and Protestant Episcopalians.

Education. On account of its scattered and rural population, and of its great number of negroes, educational conditions in Mississippi were not satisfactory until recently. Since 1910 a series of measures have been introduced which are bringing good results. These include the establishment of agricultural high schools, the creation of a textbook commission, the establishment of a normal school for the training of teachers and the nomination of a supervisor of elementary rural schools. The schools are maintained from a permanent school fund, which is supplemented by local taxation and by a poll tax of $2 a year from each registered

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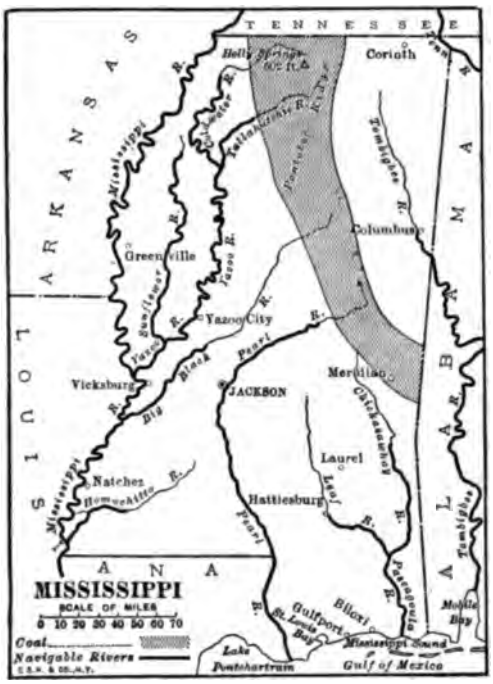
voter. The administration of the schools is in the hands of a state board of education, composed of the governor, the attorney-general and the superintendent of education. Each county has its own school superintendent, elected for four years. Separate schools are provided for white and colored children.

At the head of the educational institutions are the state university, situated at Oxford; an agricultural and mechanical college at Starkville, a normal school for training white teachers at Hattiesburg, and the Industrial Institute



OUTLINE MAP OF MISSISSIPPI

Showing the boundaries, navigable rivers, principal cities, coal deposits and the highest point of land in the state.

and College at Columbus, for the education of women. Several educational institutions are maintained by religious denominations, such as Mississippi College at Clinton, Millsaps College at Jackson, Meridian College at Meridian. Rust University at Holly Springs; Tougaloo University near Jackson; Alcorn Agricultural and Mechanical College at Westside; Campbell College and Jackson College at Jackson, and the industrial schools at Holly Springs and Vicksburg are among the higher educational institutions provided for negroes.

In the percentage of its illiterates Mississippi ranks rather high, owing to negro population. The percentage of illiterates in 1910 was 35.6 among negroes, 15.1 among foreign-born whites, and only 5.2 among native whites. See ILLITERACY.

Charitable and Penal Institutions. The state maintains a school for deaf and dumb children and one for blind children at Jackson. There are hospitals for the insane at Jackson and Meridian, and the state maintains several hospitals at Jackson, Natchez and Vicksburg. The state penitentiary is at Jackson, and convicts are also employed on several state farms and plantations. These farm penitentiaries are controlled by a board of trustees elected by the people. Mississippi has abolished the system of hiring convicts to corporations or private employers.

Physical Features. Mississippi is crossed from north to south by a broad, low ridge, which divides the state into two river basins—the eastern, which is drained into the Gulf of Mexico, and the western, which drains into the Mississippi River. To the west of this ridge the surface slopes gradually into the bottom lands of the Yazoo and the Mississippi. These lands are low and level. A characteristic feature of the surface of the state is the strip of land contained between the Yazoo and the Mississippi rivers, known as the Yazoo Delta. This extends about 175 miles from north to south and covers an area of 7,000 square miles. The land is so low that it requires an unbroken line of levees, or artificial banks, fifteen feet high, to protect it from overflow (see LEVEE). A belt of hills or bluffs, varying in height from 100 to 300 feet and cut by deep ravines, extends along the eastern edge of the delta and southward along the Mississippi. The eastern part of the state is formed by level or slightly rolling prairies, while on the south and along the Gulf coast there is a low, marshy tract.

The principal streams in the eastern part of the state are the Tombigbee, the Pearl and the Pascagoula, all flowing into the Gulf of Mexico. The chief tributaries of the Mississippi are the Yazoo, the Big Black, the Tallahatchie, the Sunflower and the Homochitto.

Climate. The state has a semitropical climate. The summers are long, but the intense heat that would otherwise prevail is tempered by breezes from the Gulf, and the thermometer seldom reaches 100° F. The mean temperature for the summer is about 81° F. The winters are short and mild, the mean temperature being about 45° F. Winters are longer and more severe in the northern parts of the state, but even there frosts occur only during five months.

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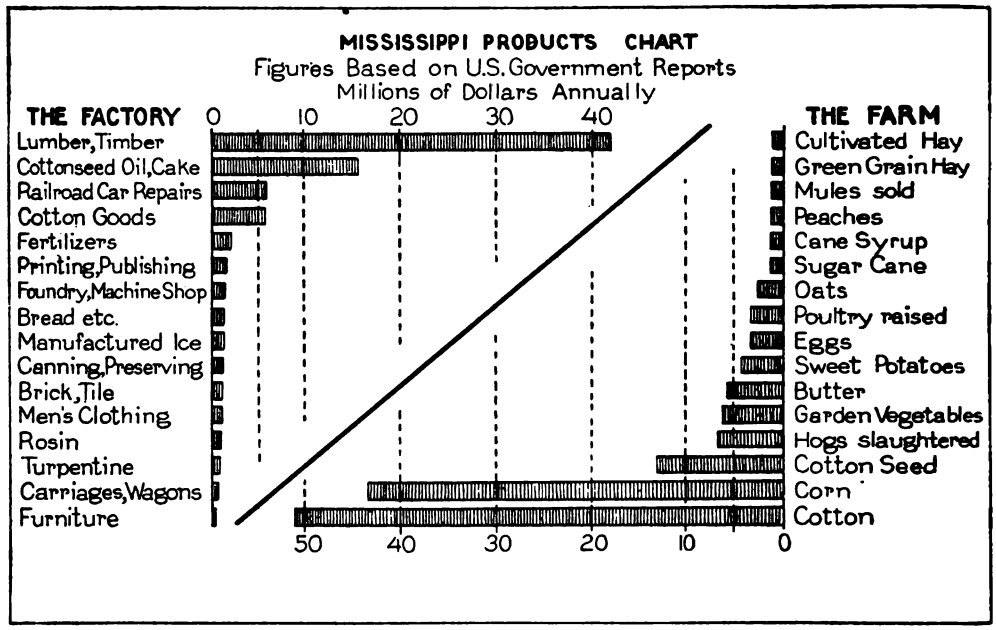

The southern part is free from frosts during ten months of the year. The average annual rainfall is fifty inches in the north and sixty inches in the south, and is evenly distributed throughout the year.

Forests. Almost the entire region was formerly covered with dense forests, and even now about 17,500,000 acres, or nearly sixty per cent of the total land area, is classed as timber land. In the south the long-leaf pine predominates; the Yazoo valley is covered with cypress, and farther north are hardwoods, such as cottonwood, hickory, ash, elm, maple and oak. The forests of Mississippi are noteworthy for the great variety of trees they contain, over 120 species of trees being found.

Agriculture. Agriculture is the chief occupation of the people, and is favored by the highly-fertile soil. The black loam of the prairies and the silt of the bluff or hilly belt are exceedingly productive, but the most fertile soil in the state is the alluvial bottom lands of the Mississippi. Perhaps nowhere else in the world is to be found soil of such depth and richness as that which covers these bottom lands. It is, therefore, not strange that nearly two-thirds of its total area of over 29,500,000 acres is occupied by farms. About sixty per cent of the farmers are negroes, and nearly all of these are tenants.

Cotton and corn are the two chief crops, and these are grown in every part of the state. The largest yield of cotton is obtained in the Yazoo delta, which is one of the greatest cotton-producing regions in the world. With about 3,000,000 acres planted to cotton Mississippi ranks fourth in acreage, coming after Texas, Georgia and Alabama. With a production usually over 1,000,000 bales, it ranks fifth among the cotton-producing states. Corn is the leading cereal produced, covering over 3,000,000 acres, which yield about 60,000,000 bushels. Oats, with an area of about 200,000 acres and a production sometimes over 5,000,000 bushels, is the only other cereal cultivated to any extent. In sweet potatoes, with 70,000 acres cultivated, and a production of 6,000,000 bushels or more, Mississippi is sometimes the second state in production. Garden vegetables, hay and sugar cane are the other chief products.

Except peaches, no orchard fruits are grown to any extent. Figs grow well in the southern half of the state, and a few oranges and grapes are raised on the Gulf coast. Apples, strawberries, pears and plums are the most prominent among the minor fruits, and the pecan, the most important nut, is increasing in importance.

Manufactures. The industries of the state are not yet well developed. Until recently the lack of coal, the absence of a good seaport and the scarcity of labor were all causes that hindered any great industrial activity. The most important single industry is that connected with lumber and timber products. This represents

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more than half of the total value of the manufactures of the state, being about $43,000,000 out of a total of about $80,000,000. In the production of rough lumber Mississippi ranks third among the states of the Union, yellow pine representing the greatest percentage of the timber cut. There are in the state over 900 sawmills.

Next in importance is the manufacture of cottonseed oil and cake. This is an industry which has sprung up only during the last two decades, and has attained large proportions. Formerly the cottonseed was simply thrown away as useless. Now there are large factories here and in the other Southern states that press out the oil from the cotton seeds, and transform the residue into cakes for feeding cattle. These products are worth millions of dollars (see COTTON). The manufacture of cotton goods is advancing steadily. Another important branch of industry is the manufacture of fertilizers from minerals, bones and the products of the cottonseed mills.

Transportation. Mississippi has excellent transportation facilities. Important trunk lines cross the state from north to south through the eastern, central and western portions, and other lines cross these from east to west. The state had 4,380 miles of railroads in 1916; the principal lines are Yazoo & Mississippi Valley, the Illinois Central, the New Orleans, Mobile & Chicago, the Mobile & Ohio, the Southern and the Mississippi Central railways.

The Mississippi River, which forms the whole western boundary of the state, constitutes a remarkable commercial waterway. The improvements effected at Gulfport in recent years have made it a valuable seaport, with a rapidly growing export trade, and the possibilities of development are almost endless.

Government and History

How the State Is Governed. Mississippi is governed under a constitution adopted in 1890. This is the fourth constitution since the state's admission to the Union in 1817. It may be amended by a two-thirds vote in each house of the legislature, indorsed by a majority vote of the people. The most interesting clauses of the constitution are those dealing with the franchise, which have been framed with the purpose of securing the political supremacy of the white race. A literacy or educational test restricts the right to vote to those persons who are able to read, or if unable to read, to explain, when read aloud to them, any part of the constitution. This test has greatly reduced the negro vote.

The executive officials, the governor, lieutenant-governor, secretary of state, treasurer, auditor and attorney-general are elected for four years. The governor, treasurer and auditor are not eligible for immediate reëlection.

The legislative power is vested in a senate of forty-five members and a house of representatives of 138 members, elected for four years. Sessions are held every two years, beginning in January of even-numbered years, and their duration is not limited. Mississippi sends eight members to the United States House of Representatives.

At the head of the judicial department is the supreme court, which consists of six members, appointed by the governor with the approval of the senate for terms of eight years. Each county has a chancery and circuit court, presided over by judges elected by the people for four years. There are, besides, in each county district courts presided over by elected judges, and there are also justices of the peace.

For purposes of local government the state is divided into counties, each administered by a board of supervisors composed of five members, one for each of the five districts into which the county is divided. The towns and cities may adopt the commission form of government, also the recall and initiative. After six years under commission government any city may vote to abandon its commission charter.

Other Constitutional Provisions. Mississippi has adopted the primary election law providing for the direct nomination of all state, district and county officers. In 1908 the state prohibited the liquor traffic, and has since passed several measures for strengthening that law. The agreement of nine jurors constitutes a verdict in civil suits. The giving of tips in hotels, restaurants, dining and other cars is forbidden. The employment of children under twelve years of age in factories and mills is unlawful, and children under sixteen years must not be employed for more than ten hours a day at any occupation.

Mississippi was one of the earliest states to recognize the rights of married women; they are placed on an equality with their husbands in buying or selling property or making contracts.

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History. Before the advent of the white man these regions were inhabited by three powerful tribes of Indians—the Chickasaws in the north, the Choctaws in the center and the Natchez in the southwest. In addition, there were some other weaker tribes, such as the Yazoos in the Yazoo valley the Pascagoulas and the Biloxis on the borders of Mississippi Sound. The region was first explored by the Spanish adventurer De Soto in 1541 (see DE SOTO, FERNANDO). The French explorer, La Salle, took possession of the country in the name of France in 1682, this region being included in what was known as Louisiana (see LA SALLE, RENÉ-ROBERT).

The first settlement in the present state by the French was at Biloxi, in 1712; the second, at Fort Rosalie, now Natchez, in 1716. The territory did not prosper under French rule, and it was ceded to Great Britain in 1763. Immediately immigrants arrived in considerable numbers from the English colonies on the Atlantic coast, and also from Scotland, and the colony began to flourish. In 1781 England ceded the southern part, known as West Florida, to Spain. By the Treaty of Paris, in 1783, which closed the Revolutionary War, the northern boundary of West Florida was placed at 31° latitude, and a long dispute between Spain and the United States resulted. This lasted until 1795, when Spain released its claim to the territory north of that line. In 1798 the territory of Mississippi was organized; this was extended in 1804 to the boundary of Tennessee, and in 1813 to the Gulf of Mexico.

Progress as a State. On December 10, 1817, Mississippi was formally admitted as the twentieth state of the Union. Jackson, the capital, was founded in 1821. In 1816 the Chickasaws, and in 1832 the Choctaws, ceded to the United States their lands, which were thrown open for settlement. The state was greatly opposed to the antislavery movement, and adopted the Ordinance of Secession on January 9, 1861. One month later Jefferson Davis of Mississippi was elected President of the Confederacy. In or on the borders of the state were fought the

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RESEARCH QUESTIONS ON MISSISSIPPI

(An Outline suitable for Mississippi will be found with the article "State.")

How can you tell whether Mississippi was named for the great river or the river was named for the state?

How many states have a greater area than Mississippi? How many have a greater population? What state is nearest it in size?

How many states were admitted to the Union after the close of the Revolutionary War and before Mississippi became a state?

How does Mississippi compare with Minnesota as regards proportion of foreign-born citizens? With Massachusetts?

Do more of the people live in cities or in rural districts? How many people out of each hundred live in a town of more than 2,500 inhabitants? Does this percentage seem to be increasing or decreasing?

What has made the educational problem a difficult one to solve in this state?

Do all voters help pay the tax levied for school purposes, or only those who have children? How is the tax levied?

Show by statistics that illiteracy in the state is noticeably decreasing.

What is the Yazoo delta? How is it protected from the overflow of the Mississippi? What is its area?

Into what body of water does all the drainage of the state find its way? By what different routes does it reach its goal?

Why is it not so hot in this Southern state as one might expect? How many "growing months" has the northern part of the state?

How large a part of the surface is covered with forests? Is this a larger or a smaller proportion than Florida has? Than Arkansas?

Why would this state be an excellent field for the botanist who was especially interested in trees?

What is meant by *alluvium?* What has it done for Mississippi?

How large a proportion of the area of the state is in farm land?

Where is the great cotton-producing section of the state? How many states produce more cotton? How many have a larger area devoted to it?

Why has the development of the manufacturing industries been comparatively slow in this state?

Upon what natural resource is the chief industrial enterprise dependent?

What product that is of very considerable value is made from materials that was formerly regarded as waste?

How many constitutions has the state had? How long has it been governed under the present one?

How has the number of negro votes been decidedly reduced?

What stand has Mississippi taken on the prohibition question?

Why is it less expensive to eat at a hotel or restaurant in Mississippi than in most other states?

What important cities were named for the early Indian tribes? What river took its name from an Indian tribe?

To how many nations has the territory constituting Mississippi belonged? What was the southern part originally called?

What especial honor fell to a Mississippi citizen on the organization of the Confederacy?

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battles of Shiloh, Corinth, Port Gibson, Vicksburg and other smaller engagements, and a large part of the state was devastated during the War of Secession by the opposing armies. In 1867, during the reconstruction period, the state was placed under military government; in 1870 it was readmitted to the Union, after it had adopted a constitution enfranchising the negroes and had ratified the Fourteenth and Fifteenth amendments to the Federal Constitution. During the period of reconstruction the

AT NATCHEZ
Residence of the Spanish governor in 1781.

state was greatly disturbed by the struggle between the whites and negroes and by the extravagance and corruption of its officials. In 1875 the Democratic party obtained a majority in the legislature, and has remained in power in the state since that time. It required over a quarter of a century to recover from the losses suffered during the War of Secession, and to readjust the state's economic life to the new conditions, but after 1890 it entered upon an era of prosperity. Since that time Mississippi has made great strides in the development of its agricultural and industrial resources. The political reforms it has adopted and the social legislation it has introduced have brought the state in line with some of the most advanced states in the Union.

In national politics Mississippi has always been Democratic, except in 1840, when it voted for Harrison, the Whig candidate, and in 1872, when its vote was given to Grant. O.B.

Consult Ellett's *Outline of Mississippi History;* Garner's *Reminiscences of Mississippi.*

Related Subjects. The following articles in these volumes will be of interest in connection with a study of the geography and the industrial life of Mississippi:

CITIES

Biloxi	Laurel
Columbus	Meridian
Hattiesburg	Natchez
Jackson	Vicksburg

LEADING PRODUCTS

Corn	Lumber
Cotton	Sugar Cane
Cottonseed Oil	Sweet Potato

RIVERS

Mississippi	Yazoo
Tombigbee	

MISSISSIPPI, UNIVERSITY OF, was chartered in 1844 and opened four years later, at Oxford. Since 1882 the institution has been coeducational. It is one of the original members of the Association of Colleges and Preparatory Schools of the Southern states, and its entrance requirements are those adopted by this organization. Students from approved high schools which meet certain standards are admitted without examination. There are about thirty-five members of the faculty, and the student enrolment is over 650, to which should be added nearly 500 who attend the summer term. The university possesses a general library of about 29,000 volumes, a law library of 2,000 volumes, and grounds and buildings valued at $500,000. Except during the period of the War of Secession, the university has been in operation since it was first opened. Courses offered lead to the degree of Bachelor of Arts, Bachelor of Science, Bachelor of Laws, Bachelor of Engineering, Bachelor of Arts in Education, Bachelor of Science in Education, Graduate in Pharmacy, Master of Arts and Civil Engineer. There is also a two-years' course in medicine, for which a certificate is awarded. The grounds and buildings are valued at nearly $700,000.

MISSISSIPPI RIVER, the "Father of Waters," the greatest river of North America, and one of the greatest in the world. Indeed, if the Missouri, instead of the northern reaches of the Mississippi proper, be taken as a part of the main stream, it is the longest river in all the world. It has had a history as interesting as that of a living thing, for it has borne on its waters the dancing canoes of the Indians; those of the determined missionaries and explorers; the rafts and boats of the early settlers, and, still later, the commerce of the rich, central section of a great nation. Nor, it seems, is this last-named phase of its existence past, for present indications are that its importance as a commercial stream is to become again more nearly what it was a half-century ago (see subhead *Commerce,* below).

Its Course. Few of the world's largest rivers lie entirely within any one country, but the Mississippi with all its immense drainage system is wholly within the boundaries of the

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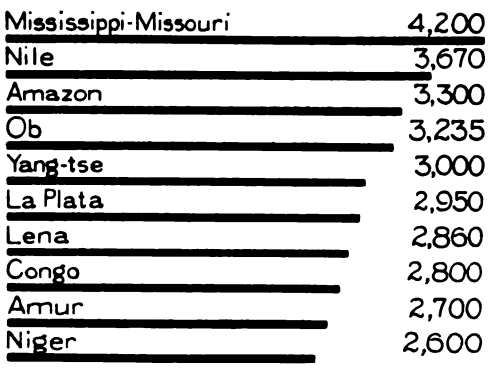
United States. From the time it leaves its reedy source in Northern Minnesota until it pours its vast floods into the Gulf of Mexico, it touches only the one country. From its source to its mouth it is 2,459 miles long, but because of occasional cut-offs at the loops and



GREATEST RIVERS OF THE WORLD

The Mississippi and the Missouri are usually considered as one river system. The diagram shows graphically the comparative lengths of the ten greatest rivers, in miles.

the back-cutting toward the sources, the length is decreasing at one time and increasing at another, sometimes as much as fifty miles during a year.

As popularly stated, it has its rise in Lake Itasca, but the lakes of that region are so numerous and so confusing that it is impossible to say in just which one the great river really has its source. But when it issues from Lake Itasca, which is 1,470 feet above sea level, it is a little stream ten or twelve feet wide and less than two feet deep. It rushes on swiftly in a northerly direction for a time, and then, twisting and circling, finds its way through lake and swamp and over rapids until it settles into its generally southeasterly flow. Tributaries join it here and there, some of them almost as large as the main river, and by the time it reaches Minneapolis it has grown to a considerable size. Still, no one looking upon it here would call it the "Father of Waters;" it must have been the Indians farther along in its course who named it.

Thus far it has been entirely within the state of Minnesota, but soon after it passes Saint Paul it ceases to run through the state and becomes the boundary between Minnesota and Wisconsin, nor does it again cross a state until, just before it reaches its mouth, it cuts across the southeastern corner of Louisiana. Meanwhile it has been bordered, on the west, by Minnesota, Iowa, Missouri, Arkansas and Louisiana, and on the east by Wisconsin, Illinois, Kentucky, Tennessee and Mississippi. It winds now to the east and now to the west in great curves, which are everywhere broken by lesser windings.

Tributaries. It receives constantly from both sides other rivers and streams—some tiny, some the centers of great drainage systems. The Wisconsin, the Des Moines, the Illinois, the Kaskaskia, the Ohio, the Arkansas, the Yazoo and the Red—these are a few of the more important tributaries, but most of them are insignificant compared with the Missouri, which pours in its vast floods a little above Saint Louis. Altogether, there are comprised in the Mississippi system no fewer than 250 tributaries and their branches.

Some Interesting Figures. As stated above, the length of the Mississippi proper is 2,459 miles, but the longest river in the world, which includes the Missouri throughout its entire course and the Mississippi below its junction with that other giant stream, has a total length of 4,200 miles. Geographers consider the Missouri the trunk stream, though it is popularly regarded as a tributary. The whole system, main streams and tributaries, affords almost 14,000 miles of navigable waterway, much of which lies between fertile banks in the richest part of the country. About forty-one per cent of the United States, Alaska excepted, sends its waters by this vast system to the Gulf of Mexico, for the drainage basin has an area of 1,240,050 square miles. In width, there are, of course, great variations, but nowhere is the river crowded between narrow banks, and so reduced to a rushing torrent, as are some of the Western rivers which start out as broad, sluggish streams. At Saint Paul the Mississippi is 300 feet wide at low water, but by the time it receives the Illinois its breadth has increased to 1,400 feet.

The Missouri makes a great change in it, and in some places, between the mouth of that river and the mouth of the Ohio, the natural width is as much as 7,000 feet. Here, as elsewhere, projects for the narrowing and deepening of the river are on foot, and where these improvements have been introduced the stream does not exceed 2,500 feet. Below the mouth of the Ohio the natural river is sometimes 10,500 feet across, but the projected width is 3,000 feet (see subhead *Floods*, below). The depth, too, varies greatly; in some places, even after the stream has become a great river 1,500 feet across, its shallower parts in mid-channel may not be more than two feet deep, while be-

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low New Orleans the depth is from thirty to sixty-two feet. Improvements are constantly in progress, and the tendency is everywhere to increase the minimum depth.

As to the volume of water poured by the Mississippi into the Gulf of Mexico, that is almost beyond conception. Every second during high-water season about 2,300,000 cubic feet are poured out, and the annual average is 675,000 cubic feet per second. Water is not the only thing carried down by the stream; it is estimated that in a year the Mississippi empties into the Gulf about 400,000,000 cubic yards of solid matter. No wonder it has built for itself one of the most extensive deltas in the world. Except the dust which is blown into the Missouri in the semiarid region, all the sediment is scoured off the higher slopes where the current is swift. In the prairie region, where the current is comparatively slow, the water cannot carry the sediment and must therefore drop and flow around it, thereby making the loops of the lower reaches.

Character of the River. Is the Mississippi a sluggish or a rapid stream? Are its waters limpid or muddy, its banks low or steep? In so long a river there is a chance for endless variations, and these the Mississippi shows in abundance; but most of its scenic beauties are to be found in its upper course, before it receives the muddy Missouri. At Minneapolis the river leaves its clay banks and flows between towering bluffs, and here, where it leaps over the Falls of Saint Anthony, used to be one of the beauty spots of the region; but commercial enterprise, making use of the water power, has destroyed the picturesque setting. Between Saint Paul and Saint Louis the river shows many and varied beauties. Its valley, from one to three miles wide, is bordered here and there by bluffs of sandstone or of limestone, and the river in its windings touches now the eastern, now the western bluff. The bluffs are for the most part heavily wooded, but here and there, especially in the Saint Louis region, they form veritable rugged palisades.

In its northern course the river is clear and placid, and when the Missouri pours in its waters a curious thing may be observed. For miles the two streams flow side by side, their waters scarcely mingling, the red, muddy waters of the western stream presenting a distinct contrast to the clearer water from the north; in time they mix, and through the rest of its course the Mississippi is turbid. Its lower course, too, is between flat shores formed by its own silt—an alluvial valley as rich as that of the Nile. It twists and winds, forms bayous and lakes, and frequently changes its channel; and through much of this region the surface of the river at high water is above that of the bordering flood plain, and the waters are confined only by the banks which they have built. Finally, through its varying channel which becomes narrower below the Yazoo, the river reaches the delta—a marshy stretch of fine sediment which in places is impassable. Here it divides into several arms, and pours its vast store of water into the Gulf. See illustration, under the title JETTY.

Floods. It is impossible to describe the Mississippi without referring to its floods, with which man has waged war for many years, and not always successfully. Heavy and long-continued rains swell its tributaries, and since in

DRAINAGE BASINS

The approximate limits of the drainage basins of the rivers whose waters reach the Gulf through the Mississippi. The area of each basin and its percentage of the entire system appear in the following table:

DESIGNATION	SQ. MI.	PER CENT
Ohio Basin	201,700	0.16
Upper Mississippi Basin	165,900	.13
Missouri Basin	527,150	.43
Arkansas Basin	186,300	.15
Red Basin	90,000	.07
Central Valley	69,000	.06
Totals	1,240,050	1.00

the lower stretches much of the surrounding country is but slightly higher than the surface of the river at low water, the result is disaster. Such floods occur in the spring, when the river is normally highest, and there have been many in the history of the river; but the greatest and most destructive was that of 1912. About $42,000,000 worth of property was destroyed, and some lives were lost. In the following year occurred another great flood, but the levees stood the strain better and not so much damage was done. See LEVEE.

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Man has not tamely submitted to the ravages of the river, and the methods resorted to for protection have been various. First of all, there have been constructed works, which by confining the river in a narrower bed have com-

LOWER COURSE, AND DELTA

pelled it to scour out a deeper channel. These are not masonry walls, but dams composed of piles driven into great heaps of brush. Then there are the dams or levees which protect the river banks throughout much of the region below Cairo, Ill., where the great river receives the Ohio, for south of that is the flood locality. In moderate flood years the levees afford adequate protection, but when an unusual flood occurs, breaks or crevasses appear here and there, and the water spreads over the lowlands. Jetties for deepening the channel have been constructed, especially in the region of the "passes," into which the river divides as it finds its way across the delta. See JETTY.

Power Dams. Several great power dams have been built at various points on the river. The first is at Bemidji, thirty-two miles below Lake Itasca, and there are others at Grand Rapids and at Brainerd, 300 miles from Bemidji. From Brainerd to Minneapolis, a distance of 150 miles, there is a fall of 444 feet, about 135 of which is utilized by six power dams. A large lock and power dam, completed in 1915, was built by the United States government between Minneapolis and Saint Paul, and at Keokuk, Iowa, the Des Moines Rapids have been replaced by a beautiful artificial lake about a mile wide and from fifty to sixty miles long, through the construction of a magnificent concrete dam (see KEOKUK, IOWA, subhead *Keokuk Dam*).

Commerce. Back in the days of the Indians and the early settlers, everything which the North had to sell to the South went down the Mississippi, but there was little commerce up stream, owing to the difficulty of making headway against the current. It was cheaper and easier to abandon the rough rafts on which the goods were floated down than to bring them back again. But when the steamboat came these conditions changed. The first steamboat to ply on the Mississippi began its trips in 1811, but not until six years later did a steamboat find its way as far north as Saint Louis. Boats of the new pattern multiplied rapidly, and by 1835 there were no fewer than 230 engaged in traffic up and down the river, and the number continued to grow. There were skins and lumber from the far north, grains and other farm products from the central region, and coal from that section served by the Ohio—all to be sent down the river; while the South sent back to the North its cotton, its fruit and its sugar cane.

Cities sprang up along the banks: Minneapolis and Saint Paul, Winona, La Crosse, Keokuk, Dubuque, Davenport, Rock Island, Burlington, Quincy, Saint Louis, Cairo, Memphis, Vicksburg, Baton Rouge and New Orleans; and river navigation became a great science. It had its dangers—many of them—and a surprisingly large number of boats were lost. Fire destroyed many, and snags and rocks many more. Life on the river, largely because of this element of danger, became the great adventure to the dwellers on its banks, and to be a river-pilot was the supreme ambition of many a boy. Mark Twain had it with the rest, and was able to gratify it; and of his impressions he has written most interestingly in *Life on the Mississippi*.

From 1860 to 1885 was the great period of river commerce. Since the latter date there has been a steady decline, and in recent years not more than one-sixth as many boats ply the river as were to be found there in 1860. Many of the river ports are still busy and active, but more of them have lost the pleasant bustle which made their riversides alive. The great floating palaces, a trip on which was at one time looked upon as the height of luxury, no longer exist, and the occasional pleasure boats are not crowded with passengers as in the old days. The change has come largely with the increased mileage and efficiency of the railroads, but the uncertainty and irregularity inseparable from river navigation have done their part.

In very recent times a return of the lost activity has been prophesied. More than one city is improving its docks, and companies have been formed for the construction of great river barges. If all that these signs foretell comes

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true, the "Father of Waters" may see restored the period of romance and of glory. J.R.

Consult Chambers' *The Mississippi River and Its Wonderful Valley;* Shea's *Discovery and Exploration of the Mississippi Valley.*

MISSISSIPPI SCHEME, known also as the "Mississippi Bubble," a gigantic financial scheme projected in Paris in 1717 by John Law, a Scotchman. The object of this experiment was to secure money for France to pay war debts and other national obligations which followed upon the reign of Louis XIV. The system, as stated by Law, was to create and formulate a vast association for trade, to be known as the Mississippi Company. The French government granted to the company the territory of Louisiana, then an indefinite region, and also lent its credit to the bank. The company was incorporated in 1717, and 200,000 shares were placed on the market and eagerly purchased, the people of France going wild in a fever of speculation. It was claimed that mountains of gold and precious stones had been found, and the shares of the association rose to fabulous prices. The inflated scheme, which was to make everybody happy and rich, collapsed in July, 1720, when the bank stopped payment and Law was compelled to flee from the country, while the investors found themselves facing financial ruin. See LAW, JOHN.

MISSOULA, *mi zoo' la,* MONT., the county seat of Missoula County and a distributing point of importance in its territory. It is in the western part of the state, midway between the northern and southern state lines, and on the Missoula River. Helena, the state capital, is 120 miles east and south, Butte is 120 miles southeast, and Spokane, Wash., is 257 miles northwest. Railway transportation is provided by the Northern Pacific and the Chicago, Milwaukee & Saint Paul railways. Missoula was founded in 1864 and was incorporated in 1884; it was the first city in Montana to adopt the commission form of government (1910). In that year the population was 12,869; in 1916 it was 18,214 (Federal estimate). The area of the city exceeds four square miles.

Missoula is the commercial outlet of Bitter Root Valley, by irrigation made beautiful and productive of agricultural produce, especially fruits and grains. The industries of the city are dependent upon the agricultural, lumber and mining resources of the locality. Large shipments of the finest fruit of the Northwest, grain, hay, lumber, wool and live stock, are sent from this point, and its lumber mills employ over 1,000 men. Missoula has a $175,000 Federal building; a courthouse, erected at a cost of $205,000; a Masonic Temple; a Knights of Pythias Building; Saint Patrick's Hospital, one of the best-equipped institutions of its kind in the West, and the Northern Pacific Railway Hospital. The University of Montana, Academy of the Sacred Heart, Roman Catholic high school for boys and the Missoula Business and Normal College, offer educational advantages, in addition to the public schools. In the vicinity is Fort Missoula, a United States military post.

The name *Missoula* was given to the settlement by the Flathead tribe of Indians, and means *at the water of ambush;* here, at the entrance to Hell Gate Cañon, behind rocks and willows, the Indians were accustomed to attack the enemy. Throughout the state, however, Missoula is known as the *Garden City,* because of its rich gardens and abundance of flowers. On account of its mountain scenery, its location on the National Parks Highway and the many trout streams in the vicinity, it is rapidly growing in popularity as a resort for tourists.

MISSOURI, *mi soo' ri,* or *mi zoo' ri,* a state of the west-central group of the American Union, rich in natural resources and occupying a conspicuous position in the trade, industry and progress of the country. Lying in the fertile Mississippi basin, the state has agricultural resources of vast extent, but these are not its only source of wealth. The Ozark and Iron

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mountains are rich in minerals, and the forests of the south furnish a considerable part of the hardwood supply of the country. With the junction of the two greatest rivers of the United States on its eastern border, and situated in the heart of the agricultural and stock-raising country, Missouri has become an industrial and commercial center of great importance.

The state is named for its great river, which the Indians called the Missouri, meaning *Muddy Water*. It is popularly known as the *Bullion State* from the nickname, *Old Bullion*, applied to Senator Thomas Hart Benton of Missouri, that ardent friend of Western interests and supporter of gold and silver currency. Like several of the other states of the Union, Missouri has chosen the North American goldenrod as its flower emblem.

Size and Location. Ranking thirteenth in size among the states of the Union, Missouri has an area of 69,420 square miles, of which 750 square miles are water surface. The state is slightly smaller than Oklahoma, but larger than the total area of all of the New England states, with Delaware added; it is over three times the size of Nova Scotia and about one-tenth that of Quebec.

Missouri lies about midway between the Atlantic Ocean and the Rocky Mountains, and British America and the Gulf of Mexico. Added to the advantage of this central position, is the fact that it is bordered by eight states, a greater number than touch any other state in the Union but Tennessee. The entire eastern boundary is formed by the greatest of the country's rivers—the Mississippi; the Missouri, its mightiest tributary, crosses almost through the center of the state and forms the northern part of the western boundary.

The People. The earliest settlers of Missouri were the Spanish and French, but the present native population is largely descended from the emigrants from Kentucky, Tennessee, North Carolina and Virginia. In the last twenty-five years the population has increased over twenty per cent. The Germans are by far the most numerous of foreigners, but there are also many Irish, Russian and English immigrants in the state.

In 1910, having 3,293,335 inhabitants, Missouri ranked seventh in population among the states. The estimated population January 1, 1917, was 3,420,143. There are over 160,000 negroes in the state, who enjoy many of the privileges of the Northern negro, but are less ambitious and assertive. They form a large part of the laboring class, and many are in domestic service. About forty-three per cent of the inhabitants live in cities, the largest of which is Saint Louis, which ranks fourth in population among the great cities of the Union. Kansas City, Saint Joseph, Springfield, Joplin, Hannibal, Sedalia, Jefferson City, the capital, Webb City and Moberly are among the other important cities.

The Baptist, Methodist and Roman Catholic denominations are the largest religious bodies. The Church of the Disciples of Christ has recently shown the greatest increase in members, and the Presbyterian, Lutheran, Episcopal and Congregational bodies are also prominent.

Education. Although the illiteracy of Missouri averages higher than that of the other states in the west north-central group, it is less than that of any of the states which have as large a negro population, and is exceeded in all the west south-central states as well as in the east south-central and south Atlantic groups. There is an excellent system of public schools, controlled by the state superintendent of public instruction and the state board of education, which is composed of the superintendent of schools, the governor, secretary of state and attorney-general.

Free separate schools for white and colored children are required by law for every district, and attendance is compulsory for all between the ages of six and fourteen years. Agricultural instruction is given in the high schools, and in 1914 an extra appropriation was made for rural high schools and seven junior colleges, specializing in technical or undergraduate courses. Graduates from these junior colleges are admitted to the third-year class in the university.

The state maintains normal schools at Cape Girardeau, Kirksville, Warrensburg, Springfield and Maryville. In 1915, $200,000 was given by the state to erect a library with a capacity for 210,000 volumes, at the state university at Columbia (see MISSOURI, UNIVERSITY OF).

The private coeducational colleges in the state include: Washington University at Saint Louis; Missouri Wesleyan College at Cameron; Christian University at Canton; Central College at Fayette; Pritchett College at Glasgow; Missouri Valley College at Marshall; Drury College at Springfield; Park College at Parksville; Wesleyan College at Warrenton; Tarkio College at Tarkio; Scarritt-Morrisville College at Morrisville; William Jewell College (Baptist) at Liberty. There are also numerous sepa-

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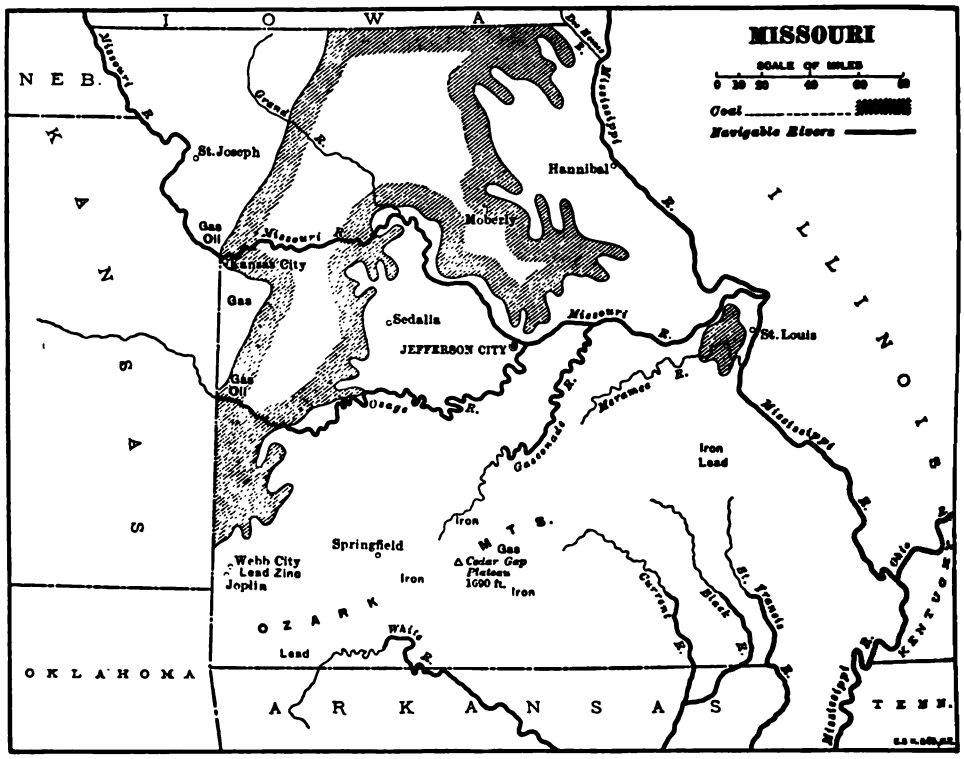

OUTLINE MAP OF MISSOURI

Showing the boundaries, navigable rivers, principal cities, coal deposits, lead, iron, zinc, gas and oil locations, and the highest point of land in the state.

rate institutions of higher learning for men and women.

In the Missouri Botanical Garden in Saint Louis, the finest garden of its kind in the United States, much field survey and important research work is being done.

Institutions. Missouri is conspicuous for its liberal provision for the poor and defective classes. The institutions of charity and correction are controlled by a state board and include: hospitals at Fulton, Saint Joseph, Nevada and Farmington; a colony for epileptics and the feeble-minded at Marshall; a school for deaf at Fulton; an institution for the blind at Saint Louis; an industrial school for boys at Boonville; an industrial school for girls at Higginsville; a Federal soldiers' home at Saint James; a penitentiary at Jefferson City. In 1913 contract labor was abolished and more humane prison conditions and regulations were introduced, and in the following year a state board of pardons and paroles was created. Funds have been appropriated for an industrial school for negro girls and mothers' pensions. The child welfare work in the state was reorganized in 1915, and in the same year the state legislature was empowered to provide by law for the pensioning of the deserving blind.

Missouri brought itself to the front rank in the country-wide fight against tuberculosis by providing for state-aided county tubercular hospitals, in addition to the state sanatorium at Mount Vernon. Provision was also made for the suppression of dust and the employment of visiting nurses by county and city courts. The total value of state property devoted to charitable institutions exceeds $1,670,000,000.

The Land. Within Missouri one finds widely diversified and picturesque landscape. In the north and northwest sections of the state there are fertile, undulating prairies and fields of deep, rich soil. On the west, these merge into the higher grassy plains of the interior, and these great pasture lands in turn rise to the rough slopes of the Ozarks and Saint François mountains in the southwest and south. These mountains form one of the most beautiful scenic regions in the Mississippi Valley. Between the knoblike peaks are deep, narrow valleys in whose depths lie hidden streams and

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mysterious caves. The attractive scenery, healthful climate and medicinal springs of the region have made it one of the most popular resorts of the Middle West. Among the well-known mineral watering places are Excelsior, Pertle and Sweet springs.

The extreme southwestern corner of the state is a wooded table-land, and in the southeastern section there are fertile lowlands, dotted with many swamps, shallow lakes and deep forests. In 1914 a land reclamation act was passed providing for the drainage and cultivation of these southern swamp lands.

Rivers and Lakes. Although there are no large lakes, Missouri ranks first among the states in the extent of navigable rivers, and to these the state owes much of its industrial and commercial importance. With the Mississippi, that great central artery of the river traffic of Central United States, extending the length of its eastern border, and crossed by the swift Missouri, the second river of the country, Missouri has become the center of the river traffic of the West-Central states. The Wyaconda and Salt rivers, draining the northeastern section; the Meramec, rising in the Ozarks; and the Saint Francis, forming the western boundary of the southern strip of the state, are other important affluents of the "Father of Waters." The Missouri is also fed by many large tributaries, among which are the Platte, Grande Chariton, Osage, Gasconade and Lamine. The White and Black rivers, entering the southwest mountain region, are tributary to the Arkansas.

Climate. Lying far from the moderating influence of the sea and the Great Lakes, Missouri has a climate marked by extremes of heat and cold. The Ozark Mountains, though affecting the temperature locally, are not high enough to afford protection to the whole state from the west winds. In the summer months, the mountains offer the only relief from the heat of the prairies and lowlands. During some winters, the temperature rarely falls below zero and only once in four or five years does the Mississippi at Saint Louis freeze over; even then it is partly due to the floating ice from the north. The Missouri, however, is often closed by ice during the winter months. The average temperature is 33° in winter and in the summer 77°. The rainfall, ranging from thirty-five inches in the north to fifty inches on the southern border, is abundant in all parts of the state.

Resources and Industry

Agriculture. The diversified character of the surface and soil makes it possible to grow many kinds of crops in the state, and according to the last official census Missouri ranks sixth among the states in the value of crops. The cereals, grown chiefly in the well-watered fields of the north and northwest sections, are the chief crops. Corn is the most important of these, and in its production Missouri closely follows Nebraska, a state which is surpassed only by Illinois and Iowa. In 1915 the output of corn was 209,450,000 bushels, valued at $119,386,000. Wheat is second in importance and the average production is well over 30,000,000 bushels. Missouri wheat is of an especially fine variety and the flour made from it is in high demand in both domestic and foreign markets. Potatoes, sorghum, hay, oats, rye and tobacco are other large crops, and cotton is raised in the southeastern section.

All varieties of fruit can be successfully cultivated and are of a fine quality. Apples and peaches grow in all parts of the state, and in addition to these and other Northern fruits, as the pear, plum and cherry, the more tender fruits, such as nectarines and apricots, are grown. Small fruits are important, and Missouri leads all of the states in the production of blackberries and dewberries. There are many varieties of cultivated grapes, and six native kinds are found in luxuriant growth; no state, not even California, surpasses Missouri in the quality of its red and white wines.

More than three-fourths of the approximate land area is in farms, and over one-half of the total area is improved land. In 1915 the state provided for a state land bank to loan money on farm lands up to fifty per cent of their value for five to twenty years.

Stock Raising. The central prairies, covered with blue grass, timothy, and red and white clover, are especially suited to fine stock raising; Missouri ranks among the leading livestock states. In the raising of mules the state is surpassed only by Texas. Missouri mules are known everywhere for their superior quality. The cheapness of Indian corn and the proximity of the great markets at Kansas City and Saint Joseph make the raising of hogs and cattle especially profitable in the northwest, and in the production of swine Missouri is about on a par with Illinois, which is sur-

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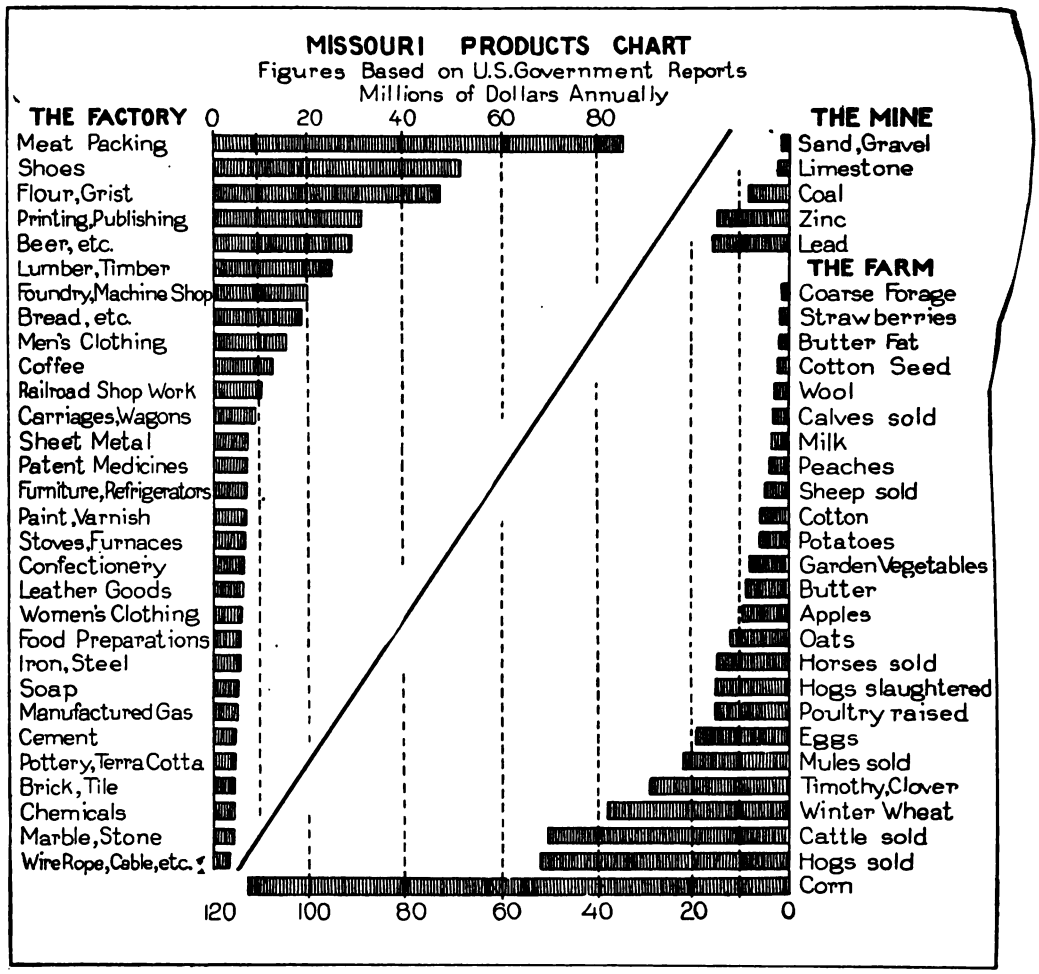

passed only by Iowa. In 1914 the state constructed one of the largest hog serum plants in the country. Sheep raising is carried on extensively in the grassy uplands of the south, and in the horse markets Missouri is noted for its fine, blooded stock. In 1916 the total value of the live stock in the state was $267,504,000.

Forests. Over forty per cent of the total area of the state is timberland, and the lumber industry gives employment to a greater number than any other industry but the boot-and-shoe manufactures. The hardwoods of the Ozark region furnish the most valuable lumber. Cedars are found in the eastern section, and swamps of cypress border the southeastern rivers. The total value of the lumber products of the state exceeds $8,400,000 annually.

Minerals. Although an agricultural state, Missouri has vast mineral wealth and leads all of the other states of the Union in the production of zinc, lead, tripoli and barytes. The great lead mines of southeastern Missouri, especially those in Saint François and Madison counties, recently have shown a greater development than any other lead-producing district in the United States, and since 1908 have surpassed the Coeur d'Alene district in Idaho, formerly the leading lead region in the Union. The lead product, which exceeds $15,000,000 in value, together with the zinc, the value of which is over $10,000,000, forms over one-half of the entire mineral output of the state. The great zinc industry in the mountainous region in the southwest has caused the rapid growth of Joplin and of Webb City.

Missouri's coal fields in the northwestern part of the state cover over 23,000 square miles and are continuations of the coal deposits in Kansas and Iowa. This state was the first of those west of the Mississippi to mine coal, but owing

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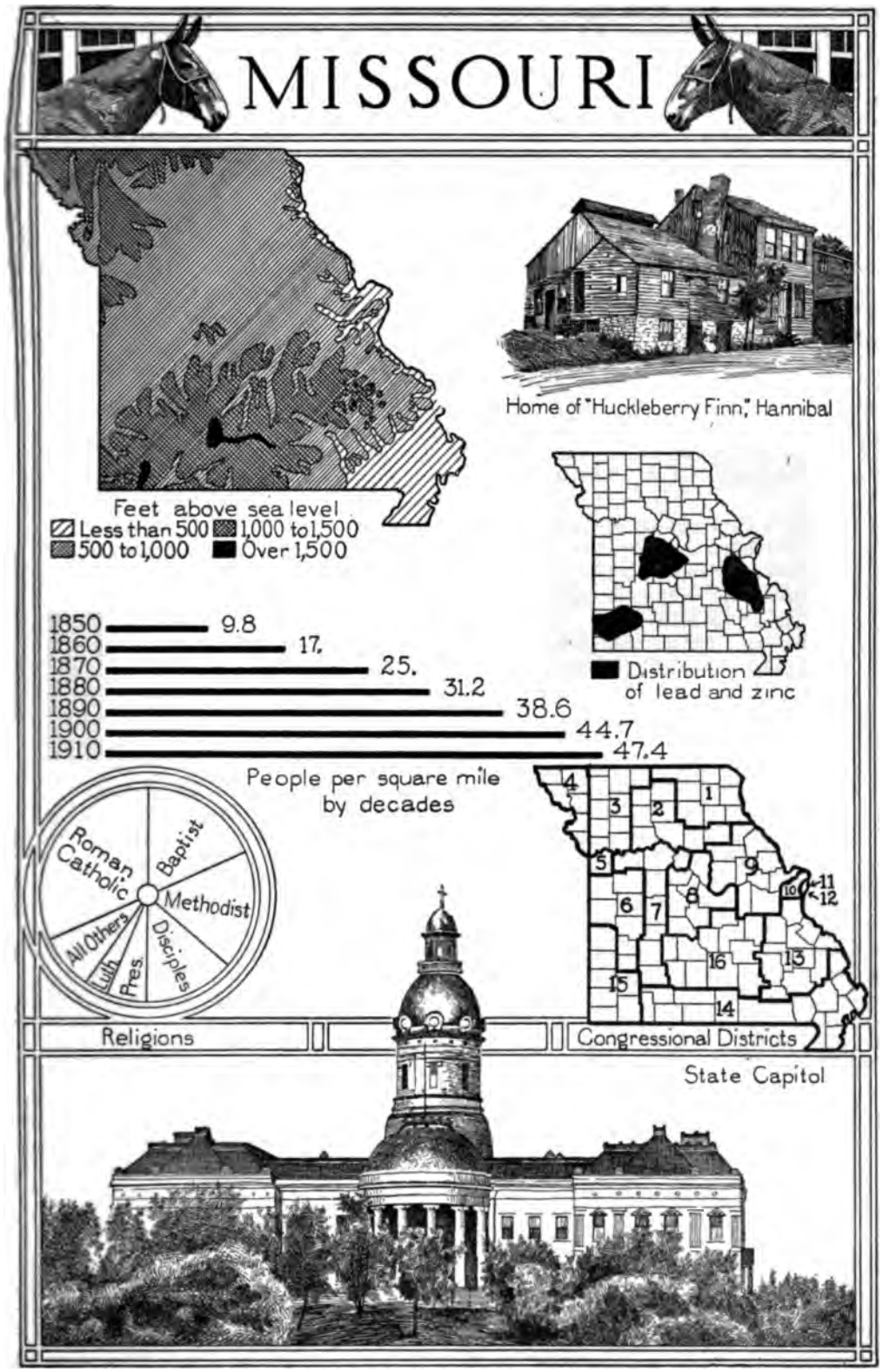

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to the recent development of the fields in Kansas and Oklahoma the output is not of great importance in the country's production. However, coal mining ranks third among the mineral industries of the state; over 10,000 miners are employed and the average output exceeds 3,500,000 long tons. It is estimated that the available supply is 83,820,000,000 tons. Clay products, especially fire brick, are fourth in importance. Portland cement is also among the chief mineral products, the average annual output exceeding $4,500,000 in value. Other minerals found in considerable quantities are copper, nickel, cobalt, silver, iron, granite, limestone, sandstone and fine sand used in the manufacture of glass. Iron Mountain is said to be the largest known mass of pure iron in the world. The average annual income from the mineral products of the state exceeds $54,000,000.

Laws have been passed requiring safe and sanitary conditions in the mines, insurance against industrial dangers such as lead poisoning, and restricting the labor in silica and glassworks to eight hours a day.

Manufactures. Besides these large agricultural and mineral interests, Missouri has many and important manufacturing industries. The industrial prominence of the state is largely due to its central location, excellent facilities for transportation and abundance of raw materials and fuel. Saint Louis, the chief industrial center of the state, ranks fourth among the manufacturing cities of the Union, and Kansas City and Saint Joseph are also centers of varied and important branches of trade. The leading industry of the state, when measured by the value of products, is slaughtering and meat packing, though others exceed it in number. The largest stockyards are at South Saint Joseph. Missouri is surpassed only by Massachusetts in the manufacture of boots and shoes, which also ranks as the second industry in the state. This has been of comparatively recent development, increasing over 325 per cent between 1900 and 1910. The chief shoe manufactories are located at Saint Louis, but the shoe-making industry is by no means confined to that city, for it has spread to many of the small cities and towns.

Third in importance are flour mill and gristmill products. Besides the large mills in the cities, many small mills are located in the rural districts. Other large industries in the order of their importance are: printing and publishing; the brewing of liquors; the manufacture of lumber and timber products; foundry and machine shop work; the manufacture of clothing; the roasting and grinding of coffee and spice; the manufacture of bakery products, railroad cars, pipes and tobacco. The smelting and blast furnaces, the manufacture of glass, paints and pottery and marble and stone work are important, and the manufacture of smoking pipes is a distinctive industry of the state. Missouri now ranks among the first ten manufacturing states of the Union, the annual value of its products being about $575,000,000.

Laws were passed by the state in 1913, limiting female labor in factories to fifty-four hours per week, protecting trade unions and abolishing trusts. In 1915 further industrial legislation provided for safety precautions in large establishments.

Transportation and Commerce. Transportation facilities are especially excellent in Missouri, for besides having more navigable rivers than any other state, it has exceptional railroad accommodations. Although there is still much river traffic on the Mississippi between Saint Louis and the Gulf, the railroads have furnished cheaper and faster transportation for much of the trade formerly carried by river boats. Since the use of railroad transportation the trade in cotton especially has increased, and Saint Louis has become one of the leading cotton markets in the Union; having railroad connection with all parts of the country, it is a distributing point for many other products. A network of railroads extends over the northern section of the state and many trunk lines cross the state to the south and west. The chief roads are: the Missouri Pacific; Atchison, Topeka & Santa Fe; Saint Louis & San Francisco; Kansas City Southern; Chicago, Burlington & Quincy; Chicago & Alton; Wabash; Missouri, Kansas & Texas. The total mileage of steam roads exceeds 8,100 miles, and the electric roads, of which there are over 800 miles, are continually being extended. The railroads of the state are regulated by a board of railroad commissioners. In 1915 Missouri passed safety laws abolishing railroad grade crossings in cities and regulating the lighting and protecting of all crossings.

Missouri is taking an active part in the country-wide campaign for good highways, and many of the notoriously muddy roads of the state are being improved. There are over 8,000 miles of surfaced roads, and the state is crossed by the Jefferson Highway, extending from New Orleans to Canada.

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RESEARCH QUESTIONS ON MISSOURI

(An Outline suitable for Missouri will be found with the article "State.")

What does the name of the state mean? What is its popular name, and how did it receive it?

How many states have the same state flower as Missouri?

What special distinction has the state with reference to the two greatest rivers of the country?

How many states have a greater area? What state closely resembles it in size?

How many states border upon Missouri? What other states have as great a number bordering upon them?

What is the average number of inhabitants to the square mile? Is this larger or smaller than the average for the country as a whole?

How many states have a larger population? Do all of these exceed Missouri in area, as well?

Which would you rather have, a year's yield of the forests or a year's yield of the zinc mines?

How does Missouri's largest city rank in size among great cities of the country?

What do the illiteracy statistics of this state tell about the intellectual condition of its negro inhabitants?

What has the state done in the fight against tuberculosis?

Where is Missouri's chief scenic region?

What has been done toward making a certain section of the state more healthful as well as more productive?

What natural advantage has this state over others in the matter of transportation?

Why does this state have a distinctly "continental climate"—one marked by extremes of heat and cold?

How many states rank above Missouri in value of total crops? In value of its chief crop?

In what one of California's most important products does Missouri rival that state?

How, besides in the matter of education, does the state help the farmer?

Why is the northwestern part of the state particularly well suited to the raising of hogs and cattle?

What two cities have profited by the growth of one of the chief mining industries?

Of what two minerals does this state produce more than any other state?

Why does the coal production of Missouri no longer possess the importance it once did?

Describe Missouri's great mass of pure iron.

What remarkable development did the second manufacturing industry of the state make during one decade?

Why is river navigation no longer of such great importance as it once was?

How many constitutions has the state had? How long has it been governed under its present one?

What famous legislation of Congress took its name from this territory? What did this legislation accomplish?

What part did the state play in the War of Secession?

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Government and History

Government. The constitution under which the state is now governed is its third, and was adopted in 1875. Amendments may be proposed by a majority vote in each house of the legislature, and are then submitted to the popular vote at the next general election.

Executive Department. The governor, lieutenant-governor, secretary of state, treasurer, state auditor, attorney-general and superintendent of public instruction, all elected for terms of four years, are the executive officers of the state. The governor and treasurer are not eligible for reëlection.

Legislative Department. The law-making body, or general assembly, is composed of a senate of thirty-four members, elected for three years, and a house of representatives of 142 members, chosen every two years and apportioned according to the population of counties.

Judiciary. The judicial department consists of a supreme court, a court of appeals, circuit and inferior courts. All of the judges are elected by the people.

In 1913 juvenile courts were extended to all counties. In this same year the initiative and referendum were established; a law was also enacted providing for the nonpartisanship of judges. Municipal home rule has been granted to cities having a population of over 100,000, and the commission form of government may also be adopted in cities and towns. Missouri has enacted particularly harsh laws aiming at the control of corporations. The liquor traffic is controlled by local option laws.

Exploration and Settlement. Before the coming of the white man, Missouri was occupied by the Shawnee, Osage, Missouri and Mandan Indians. Although De Soto explored the Missouri in 1541, and Marquette and La Salle passed its banks on the Mississippi in 1673, the territory remained in the hands of the Indians until 1682, when La Salle took possession of it as a part of the French territory of Louisiana.

The French explored the interior and made the first settlements at Sainte Genevieve and New Bourbon. The site of Saint Louis was chosen by Pierre Laclede Liguest in 1763, and in the next year Auguste Chouteau began the building of the village. For many years the settlements were confined to the neighborhood of the river. The ownership of all of the territory west of the Mississippi was transferred to Spain in 1763 by the Treaty of Paris, but in 1800 it was ceded back to France.

The territory of Louisiana, of which Missouri was a part, was purchased from France by the United States in 1803. The northern section of this region, called Upper Louisiana, was occupied by the government in 1804, and eight years later was organized as the Territory of Missouri.

As a United States Territory. At the time of its organization as a territory, Missouri had a population of over 20,000, and the agricultural and mining industries were already supplanting the fur trade. Being on the southern boundary of the Northern states and settled by many Southerners, Missouri was a point of bitter contention in the slavery question. When, in 1818, the territory asked admission into the Union, the nation-wide controversy arose which was not settled until 1820, when Henry Clay offered the famous bill known as the Missouri Compromise. Upon its terms Missouri was admitted as a slave state on July 19, 1820. The capital of the new state was at Saint Charles, but six years later it was moved to Jefferson City, which is more centrally located.

Statehood. The first census of the state, taken in 1821, showed the population to be 70,647, of which number 11,254 were slaves. Missouri was again involved in slavery difficulties at the time of the settlement of Kansas.

In 1861, although Governor Jackson and many in the legislature favored secession, the majority in the state convention were opposed to the Confederacy. The people were about equally divided in sentiment, and often members of the same family joined opposing forces. The governor, who had fled from the capital, summoned troops for the Confederacy and they assembled in large numbers in the southwestern part of the state. In a battle near Springfield they defeated the Union troops, and as a result General Fremont, commander of the West, declared martial law throughout the state. In 1862 the Confederates under General Price held half of the state, but were later driven into Arkansas by General Curtis. Price, who returned to the state in 1864, was finally defeated, after which there was little fighting of importance in Missouri.

In 1865 a new constitution was adopted, and four years later the Fifteenth Amendment to the United States Constitution was accepted. Since 1875 the state has enjoyed wonderful prosperity, and it is now among the leading states in the Union in population, trade, indus-

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try and agricultural and mineral wealth. Missouri has had but two Republican governors, those whose terms began in 1865 and 1909. The state was prominent in the Presidential campaign of 1912, furnishing one of the candidates for the nomination, Champ Clark, then Speaker of the House of Representatives. The war against corporations, begun in 1908, and later industrial, social and judicial legislation have also added to Missouri's prominence. E.B.P.

Consult Carr's *Missouri*, in American Commonwealth Series; Rader's *History of Missouri from the Earliest Times to the Present*.

Related Subjects. The following articles in these volumes contain much that will be of interest in connection with a study of Missouri:

CITIES

Cape Girardeau	Moberly
Carthage	Saint Charles
Columbia	Saint Joseph
Hannibal	Saint Louis
Independence	Sedalia
Jefferson City	Springfield
Joplin	Webb City
Kansas City	

HISTORY

La Salle, Sieur de	Missouri Compromise
Louisiana Purchase	War of Secession

LEADING PRODUCTS

Apple	Lumber
Blackberry	Meat and Meat Packing
Boots and Shoes	Mule
Cattle	Peach
Cow	Wheat
Hog	Wine
Lead	Zinc

MOUNTAINS

Iron Mountain	Ozark

RIVERS

Mississippi	Platte
Missouri	White

MISSOURI, UNIVERSITY OF, a coeducational institution, founded at Columbia in 1839, and now organized into a college of arts and sciences, a college of agriculture, schools of commerce, education, engineering, journalism, law, medicine, mines and metallurgy, the graduate school and the extension division. Experiment stations are maintained in connection with the departments of agriculture and engineering. The university organized the first school of journalism in the world and the first school of education in any state university. All of the university divisions, with the exception of the school of mines and metallurgy, which is at Rolla, are located at Columbia. The campus at Columbia contains about seventy acres and that at Rolla, twenty-seven. The university also owns a farm of nearly 800 acres.

The equipment of the institution, which is valued at over $3,646,000, includes a library of nearly 200,000 volumes and 100,000 pamphlets. The regular enrolment is over 3,800, but the summer session attracts in addition about 1,300 students of university grade. The distinguishing feature of the state university of Missouri is the emphasis which it places on what is fundamentally the most practical.

MISSOURI COMPROMISE, *kom'pro mize,* one of the most important measures ever passed by the Congress of the United States, introduced by Senator Jesse B. Thomas of Illinois, and approved by President Monroe in March, 1820. The most important provisions of the measure were the following:

Missouri shall be admitted into the Union as a slave state, but slavery shall be forever prohibited north of the southern boundary of Missouri; namely, 36° 30′ north latitude.

The Missouri Compromise was the culmination of one of the early battles between the slavery and antislavery factions. In the year 1819 both Maine and Missouri applied for admission into the Union. Maine had already adopted a constitution prohibiting slavery, and as up to that time the number of free and slave states had remained equal, the Southern leaders in Congress refused to admit Maine free unless Missouri should be admitted with slavery. Both sides accepted the compromise as a satisfactory solution of the problem, and by a separate bill Maine came into the Union as a free state.

The admission of Missouri, however, was delayed until 1821, as some of the provisions of its constitution were objectionable to the North. Henry Clay, whose support of the act of 1820 won him the title "the Great Pacificator," was also influential in securing the second compromise by which Missouri was admitted into the sisterhood of states. The Missouri Compromise, which remained in force until repealed by the Kansas-Nebraska Bill of 1854, was the first act in American history which by law divided the North into free, and the South into slave, territory.

MISSOURI RIVER, a river of the United States which forms part of the longest river system in the world; for while it is usually described as a tributary of the Mississippi, it is in effect part of that great stream. From its source to its junction with the Mississippi it is 2,945 miles long, while the length of the combined rivers from the source of the Missouri to the mouth of the Mississippi is 4,200 miles—a length which no other river in the world approaches.

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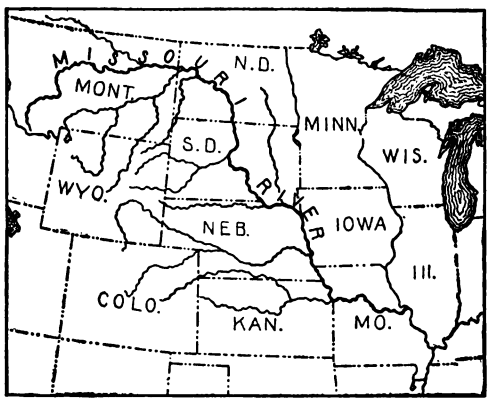
Its Course. High in the slopes of the Rocky Mountains rise three rapid rivers, two of them having their source within Yellowstone Park. These are the Jefferson, the Madison and the Gallatin, and they all unite at Gallatin City, Mont., 4,032 feet above sea level, to form the Missouri. A rushing stream, almost a torrent here in its upper stretches, it hurries through the Gate of the Rockies, a deep, steep-sided gorge; leaps the cataracts at Great Falls, and flowing first north, then east, makes its way



THE MISSOURI RIVER
Almost 3,000 miles in length, this stream and its tributaries affect nine great states, each an inland empire. (See, also, chart, page 3851.)

across Montana. Just as it enters North Dakota it is joined by its largest tributary, the Yellowstone, which rises in Yellowstone Park not far from the two source-streams of the Missouri.

Crossing North Dakota in a great curve, the river flows through South Dakota, divides Nebraska from Iowa and Missouri, forms the northeastern boundary of Kansas, and then, with an easterly trend, winds across Missouri. Twenty miles above Saint Louis it mingles its waters with those of the Mississippi, and sends its vast burden of sediment down toward the Gulf of Mexico. Every second, on an average, it pours out 120,000 cubic feet of water—twenty *cubic miles* in a year! And the silt which it carries down amounts in a year to 550,000 tons.

Its Influence on Geography. The drainage basin of the Missouri has an area of almost 600,000 square miles—very nearly half that of the entire Mississippi system; for into it flow, besides the Yellowstone mentioned above, the Cheyenne, the James, the White, the Big Sioux, the Platte, the Kansas and the Osage. Along its banks at intervals are busy and growing cities, whose location it has largely determined. There are Great Falls, built because of the abundance of water power furnished by the cataracts, Bismarck, Pierre, Sioux City, Omaha, Council Bluffs, Atchison, Leavenworth and Kansas City. When it reaches these latter cities, after its mountain course is past, the Missouri is a huge stream sometimes a mile or more in width. Here, however, as in its earlier stages, it is swift-flowing and turbid, its popular name, used half in affection by those who live on its banks, but in scorn by those who have no personal feeling for it, being the "Big Muddy."

The Missouri has not, like the Mississippi, built up a huge flood plain, but its course and the state of its channel have been largely determined by the amount of sediment it carries. Cutting through the mountains, it acquires vast stores of sand and gravel, and later, when its current is less rapid, it is forced to drop much of this. Its channel, therefore, is on a bed of silt which is in some places 125 feet deep. Sometimes, however, when the spring floods come, the river cuts through all this and flows on a rocky floor.

History. In 1673 Marquette and Joliet marked the spot where the Missouri emptied its muddy waters into the clearer Mississippi, and in the next century adventurous traders made their way up the river in search of furs. For a long, long time only canoes and such primitive boats were seen on its waters, and one of the interesting early sights was a band of thirty or forty men walking along the shore and dragging a boat upstream after it had carried down its cargo of furs.

But in 1819 the first steamboat made its way up the river, and the steamboats used by the fur companies played an important part in opening up the great northwestern region. Navigation was dangerous because of the sandbars and the snags, or submerged trees, but it was not this which led to the decline of river traffic after 1860. It was the railroads, which made special rates for riverside towns, and so got all the commerce. For about a half-century the river carried little merchandise, but since 1908 determined efforts have been made by the people of the river ports to increase the use of this great highway at their doors; they are aided by the fact that freight rates on railroads are now regulated by law, and no favoritism can be shown one city over another. Improvements have been projected and completed, consisting chiefly in the building of levees and the removal of snags, and there has already been a slight increase in river traffic.

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The river is navigable to a point nearly 2,300 miles from its mouth, and, above Great Falls, for about 300 miles more, but the current is so rapid in these upper stretches that only flat-bottomed boats are practicable and safe.

MISTLETOE, *mis''l toh,* a small evergreen shrub of the mistletoe family, native to the greater part of Europe, and characterized by its habit of growing on the trunks of various trees (see PARASITE). Contrary to popular belief, the mistletoe is rarely found on the oak. Most commonly the apple tree serves as its host, but it also grows on the hawthorn, sycamore, lime, poplar, locust, fir and other trees. Its thickly-growing evergreen leaves and tiny yellow flowers give a pleasing touch to orchards in February and March, and its white, translucent berries are loved by the birds. By rubbing their bills, to which the seeds cling, against the bark of trees on which they alight, the birds help to propagate the plant.

The mistletoe is a plant of many traditions. Whenever the Druids, ancient priests of the Celts, found it growing on the sacred oak, they cut it off with a golden blade and gave bits to the people for charms. In Northern mythology it was an arrow made of mistletoe which slew

MISTLETOE

Balder, son of the goddess Frigga (see BALDER). Early European nations seem to have revered the mistletoe as a ceremonial plant, a practice which is the probable origin of the familiar Christmas custom of "kissing under the mistletoe."

MITCH'ELL, DONALD GRANT (1822-1908), an American novelist and essayist, better known under the name of IK MARVEL. He was born in Norwich, Conn., was graduated at Yale and pursued law studies in New York City. In 1853 he was appointed United States consul to Venice, but after two years settled at "Edgewood," his farm near New Haven, and occupied his time with literary work and with farming. While in Europe in 1848, he witnessed the revolution in Paris, which he described in his book entitled *The Battle Summer.* His best-known works are *Reveries of a Bachelor* and *Dream Life,* two volumes on which his fame largely rests, and *Dr. Johns, The Lorgnette* and *Wet Days at Edgewood.*

MITCHELL, JOHN (1869-), one of the most influential, active and trusted leaders in the organized labor movement in the United States. He was born in Braidwood, Ill., where he attended school until he was ten years of age. Later he studied law for a year, and also gained an extended knowledge of economic questions by private reading. When a boy of thirteen he became a coal miner, in 1885 he joined the Knights of Labor, and for the next five years worked and traveled in the West. In 1895 he became an officer of the United Mine Workers of America, served as president of the organization from 1899 to 1908, and made his influence felt by securing for the workmen better wages and an extension of the eight-hour law.

JOHN MITCHELL

The successful anthracite coal strikes of 1900 and 1902 were directed by Mitchell, who was then second vice-president of the American Federation of Labor, and he terminated the latter by agreeing to accept the decision of the arbitration committee appointed by President Roosevelt. In 1907 the Buck Stove and Range Company secured an injunction against the officers of the American Federation of Labor, because the members of that organization had been advised to boycott the products of the company. Since the blacklisting was not discontinued, Mitchell and his colleagues, Samuel Gompers and Frank Morrison, were found guilty of contempt of court and sentenced to a term of imprisonment. The case, however, was later dismissed by the Supreme Court.

In 1914 Governor Glynn of New York appointed Mitchell to the State Workmen's Compensation Board, and a year later he became a member of a new Industrial Commission which

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superseded the board. Throughout his career he has been an advocate of the "square deal" on the part of labor unions. He has written *Organized Labor: Its Problems, Purposes, and Ideals;* and *The Wage Earner and His Problem.*

MITCHELL, Silas Weir (1829-1914), better known as S. Weir Mitchell, a notable American physician, who also achieved fame as a novelist and poet. He occupies a unique place in American letters in that he made use of his professional experiences in his literary work. He was born in Philadelphia, studied at the University of Pennsylvania and was graduated from Jefferson Medical College in 1850, beginning medical practice in his home city. During the War of Secession he was an army surgeon and assumed charge of soldiers suffering from nervous disorders, after which he developed the "rest cure" treatment which found world-wide favor among physicians. Before the close of the war Dr. Mitchell began to write stories for children, but until 1880 most of his publications were medical treatises. In that year he published the novels *Thee and Thou* and *Hephzibah Guinness,* and from that time wrote novels, stories and poems at regular intervals. His first popular success, *Hugh Wynne, Free Quaker,* published in 1897, is a story of the American Revolution, and is now considered one of the best historical novels of American literature. Other works include *Dr. North and His Friends, The Red City, Westways* and *The Comfort of the Hills.* His last novel, *John Sherwood, Ironmaster,* was published in 1911; in 1914, after his death, *Complete Poems* was published.

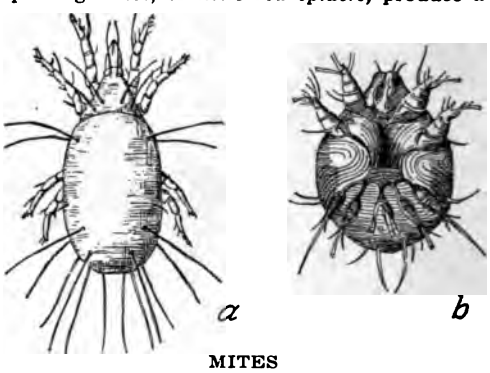
S. WEIR MITCHELL

MITCHELL, S. D., the county seat of Davison County, in the southeastern part of the state, sixty-seven miles west and north of Sioux Falls and seventy miles northwest of Yankton. It is on the James River and on the Chicago & North Western and the Chicago, Milwaukee & Saint Paul railroads. The population, 6,515 in 1910, was 7,785 in 1915, according to the state census.

Mitchell is the seat of the Dakota Wesleyan University (Methodist Episcopal). The buildings and institutions of the city include a Federal building, Carnegie Library, city hall, opera house and the Saint Joseph's and Methodist hospitals. The city is situated in an extensive, rapidly developing agricultural region and is an important shipping point for grain and live stock. The industrial enterprises include a creamery, grain elevators, lumber mills, railroad and machine shops and cigar and candy factories. There is a large wholesale trade in groceries, fruits, etc.

A corn palace is the principal feature of an annual fall festival which attracts many visitors. More than 2,000 bushels of corn are used each year in the exterior decoration of the building. The town was settled in 1879 and became a city in 1883. T.J.M.

MITES, numerous species of small insects, varying in size from tiny creatures almost invisible to the naked eye, to certain forms half an inch long. More than one-half are parasitic, at least during part of their lives; some are terrestrial or aquatic, and others live in cheese, sugar and flour (see Parasite). The body and legs are covered with bristles, hair or scales, which are characteristic in each species. The spinning mites, or *little red spiders,* produce a slender thread as they go, and the accumulated threads of many individuals make a whitish web. Another form, called *ticks,* infests animals, birds and snakes. Their mouths are formed for cutting into the skin and sucking the blood. This family produces the most injurious of all mites, namely, the *cattle tick,* which spreads disease among cattle. *Itch mites* burrow into the skin of man and animals. Formerly they were not uncommon, but cleanliness has largely destroyed them in the case of man. The majority of mites are injurious, but some are beneficial in destroying other insects, and thus are active in the preservation of plants. See Ticks.



MITES

(*a*) Cheese mite; (*b*) under side of the itch mite. The illustrations are greatly enlarged.

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MITHRIDATES, *mith ri da' teez* (135-63 B. C.), king of Pontus, on the shore of the Black Sea in Asia Minor, who proclaimed himself Asia's deliverer from the yoke of the Romans. He ascended the throne at the age of thirteen, and became a man of remarkable genius and energy. Through him the fires of insurrection were kindled as far westward as Greece. To secure his power in Asia he ordered that on a certain day every Italian should be put to death, and the slaughter was variously estimated at from 80,000 to 150,000. After this barbarous act he sent an army into Greece, but after waging two wars was forced to make peace with Sulla, the Roman dictator. The third, and greatest, Mithridatic war broke out after the death of Sulla. Pompey became dictator, made an alliance with the king of Parthia and forced Mithridates into battle and drove him beyond the Caucasus Mountains. In spite of the loss of his kingdom the spirit of Mithridates was unbroken, and he began to plan an invasion of Italy, but his son Pharnaces rebelled against him and he died by poison, at his own hand.

MITHRIDATES
From a coin.

Mithridates was a friend of culture and the arts, and it is said he spoke more than twenty languages. He kept historians and poets at his court and gave prizes to the best singers. His death removed one of Rome's greatest enemies, his name being always pronounced by the Romans with respect and dread.

MOABITES, *mo' ab ites,* the name of a tribe of warlike people in Biblical times who lived in the territory at the southeastern end of the Dead Sea, in a district now known as Kerak. They were descended from Moab, a son of Lot, and were closely connected with the Hebrews, the two peoples having had very similar languages and closely interwoven histories. After opposing the Israelites, they were subjugated by Saul and David, came under the rule of Assyria and were later conquered by Nebuchadnezzar. When their country was finally overrun by desert Arabs, culture and civilization came to a standstill, and even now their land is not entirely safe for travelers, because of the lawlessness of the inhabitants.

MOABITE STONE, an ancient black stone, about three feet eight inches high and two feet three inches wide, bearing an inscription in Hebrew-Phoenician characters. It is the oldest known of this form of writing, and was discovered in 1868 by F. A. Klein, a missionary at Diban, in Moab. An effort to purchase it by the French consul, Clermont-Ganneau, at Constantinople, led to difficulty among the Arab tribes of the district, and the stone was unfortunately broken, but the fragments were collected and a translation made of the thirty-four-line inscription, which dates from about 900 B. C. It records the deeds of Mesha, the Moabite king, and of his wars with Omri, king of Israel, and of his son Ahab. The remainder of the inscription refers to Mesha's building operations. The Moabite stone has great value as one of the oldest inscriptions in the North Semitic alphabet. It has been restored as far as possible and is now in the Louvre in Paris.

THE MOABITE STONE

MOBERLY, *mo' ber li,* Mo., a shipping point of local importance, is situated a little northeast of the geographical center of the state, in Randolph County, seventy miles southwest of Hannibal, 129 miles northeast of Kansas City and 148 miles northwest of Saint Louis. Railway service is provided by the Missouri, Kansas & Texas and the Wabash railroads. The first settlement was made in 1866; it was incorporated as a town and became the county seat in 1868. In 1873 it secured a special charter, which was surrendered in 1889 for city status. In 1910 the population was 10,923; in 1916 it was 12,752 (Federal estimate). The area is four square miles.

The district in which Moberly is located is rich in deposits of coal and fire clay, and bricks are the chief manufactured products. There is an extensive trade in live stock, dairy and farm produce, lumber, hides, wool and tobacco. Here are located the division headquarters and ex-

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tensive machine shops of the Wabash Railway, which employ 2,500 people. The city also has a shoe factory, a large grain elevator and cement works. Moberly has a $70,000 Federal building, a Y. M. C. A. building, Saint Mary's Academy, a business school and a Carnegie Library. Forrest Park, covering 200 acres, is the city's largest recreation ground. L.W.K.

MOBILE, *mo beel',* ALA., the second largest city and the only seaport of the state, is the county seat of Mobile County. It is in the southwest corner of the state, on the left bank of the Mobile River, where that stream empties into Mobile Bay. The city is thirty miles (the length of the bay) north of the Gulf of Mexico and 140 miles northeast of New Orleans. The population, which was 51,521 in 1910, had increased by 1916 to 58,221 (Federal estimate).

Mobile has an extensive domestic and foreign water commerce. Eighteen hundred miles of navigable waterways enter Mobile Bay. Large freight steamers ascend the Alabama River to Montgomery, 410 miles northeast, and up the Mobile and Tombigbee rivers to Demopolis, at the entrance of Warrior River. There are regular steamer routes from Mobile to New Orleans, New York, Cuba, the West Indies, Central America and South America. Water transportation is supplemented by the Louisville & Nashville, the Mobile & Ohio, the New Orleans, Mobile & Chicago, the Southern and the Alabama, Tennessee & Northern railroads. Two short electric lines extend westward.

The city has an area of nearly fifteen square miles. It is fifteen feet above the river, and is on a level, sandy plain which rises gradually westward to low, wooded hills. Here are favorite resorts during the heated season. Except for the business section the city is not compactly built; the pleasant homes, many of the houses in colonial style, surrounded by gardens, and the broad, regular streets lined with live oaks and magnolias, give the place much charm. Interesting and scenic features are the Bay and the "shell road" along the shore extending to New Orleans.

Buildings. The chief buildings are a $250,000 Federal building, erected in 1916, the cotton exchange and chamber of commerce, courthouse and the city hall. The Cathedral of the Immaculate Conception and Christ Episcopal Church are two of the most prominent churches.

Institutions. In Mobile is the medical school of the University of Alabama, the Convent and Academy of the Visitation, McGill Institute, Evangelical Lutheran Institute and Barton Academy, the latter a part of the public school system. Spring Hill College (Jesuit) is located five miles from the city. There are three public libraries. The city is the see of a Roman Catholic bishop. There are also a United States marine hospital, a city hospital and several infirmaries.

Industries. The Federal government has at various times financed the dredging of channels in Mobile Bay, and at a cost of more than $11,000,000 has completed the building of locks on the Warrior and Tombigbee rivers, to improve and extend the river trade. During the time from 1911 to 1914 the city made great improvements along the Bay and built docks which afford 1,500 feet of water front. The value of exports in 1915 was nearly $29,500,000. These consisted principally of cotton, cottonseed oil, lumber, timber and naval stores. The imports for the same year totaled about $3,870,000, and consisted of tropical fruits, especially bananas, coffee, mahogany, asphalt, sisal grass and manganese and sulphur ores. Mobile holds an important position among the cotton markets of the United States; quantities of cotton, garden produce, especially beans and cabbage, and corn, cotton cloth, meat products, live stock, and fish and oysters are shipped to domestic markets.

Industrial enterprises of the city include cotton compresses and cotton mills, saw mills and woodworking plants, an agricultural chemical plant, a large steel plant, machine shops and a shipbuilding yard.

History. Mobile has belonged successively to France, England, Spain and the United States. In 1699 Sieur d'Iberville, the founder of Louisiana, moved a settlement from Biloxi to Twenty-Seven Mile Bluff, a point on the river about twenty miles above the present site of Mobile. After the floods of 1709 it was moved to the third and permanent location. Until 1720 the settlement was the capital of the French province of Louisiana. In 1803 it became a part of the United States as a result of the Louisiana Purchase. In 1819 it was granted a city charter. The commission form of government was adopted in 1910. Epidemics of yellow fever have been overcome by splendid sewerage and water systems. The latter is owned by the city and the supply is exceptionally pure. R.G.C.

Consult Powell's *Historic Towns of the Southern States;* Hamilton's *Founding of Mobile.*

MOBILE BAY, BATTLE OF, a naval engagement of the War of Secession, in which Farragut, the commander of the Federal fleet, caused

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himself to be lashed to the mast of his ship during the conflict that he might the better watch the battle and give more effective commands. This engagement was fought on August 5, 1864, between the United States squadron under Farragut, and a Confederate fleet which had been inflicting great damage on Federal commerce. The entrance to Mobile Bay was protected by forts Morgan and Gaines, and the Gulf Channel, except a narrow passage under Fort Morgan's guns, was closed by piles and torpedoes. Fighting began at seven o'clock on the morning of August 5; Farragut, guiding his fleet through the lines of Confederate batteries and burning rafts, finally reached the harbor, where the ironclad *Tennessee* and three gunboats were lying in readiness for an attack. He ordered the course of his vessels directly across the torpedoes, sank one Confederate gunboat and drove another aground. The *Tennessee* attacked the entire Federal fleet, but was soon completely disabled and hauled down its flag in surrender. Forts Gaines and Morgan capitulated on August 7 and 23, respectively. Farragut accomplished this feat with the loss of only one vessel, the *Tecumseh,* and while he did not capture Mobile, he cut off all of its communication with the sea.

MOBILE RIVER, a river of Alabama, important for its situation in the center of the great cotton region. The river was named from the Mobile, or Maubila, Indians, now an extinct tribe. It is formed by the Alabama and Tombigbee rivers, which unite in Clarke County, and after a six-mile course it divides into two branches, the Mobile and the Tensas. The river is navigable for large steamers, and is an important means for inland transportation for cotton and agricultural products to the sea. The city of Mobile has an advantageous position for trade, for it is the outlet of one of the greatest cotton regions in the United States.

MOCCASIN, *mok'a sin,* **FLOWER,** or **PINK LADY'S SLIPPER,** a fragrant wild flower of the orchid family, one of the loveliest blossoms of American woodlands in the flowering months of May and June. It belongs to a subdivision of the orchids known as lady's slipper (which see). Its large, showy blossom bears an inflated sac or lip, which gives it a curious resemblance to a slipper, or moccasin, and its popular names have been thereby derived. The moccasin flower is distributed from Canada southward to North Carolina and westward to Kentucky and Minnesota; the latter state has chosen it to be its state flower. Once it grew in profusion, but the exquisite pink blossoms proved so tempting to the wayfarer it is now one of the rarest of the wild flowers. The inflated lip of this plant is a wonderful device of nature to help in the work of cross-fertilization (which see). Through a fissure down the front the bumblebee pushes its way inside to feast on the rich stores of nectar, and in its escape it leaves behind a supply of pollen and carries away on its back another load, which will be deposited within the flower next visited. See BOTANY, subhead *Why Plants Need Insects.*

MOCCASIN FLOWER

MOCCASIN SNAKE, a vicious, poisonous serpent of the pit viper family, related to the copperhead (which see). By some authorities its poison is considered more dangerous than that of the rattlesnake. It is sometimes called the *cotton mouth,* as its mouth, when wide open, shows white in contrast to the general color of the body, which is dark brown. On its sides are dim, blackish bars, and its black abdomen is marked with spots of yellowish-white. Its body is four feet in length, and its tail, which is entirely without rattles, is about seven inches long. This reptile is found in large numbers in the swamps and marshy regions from southern Indiana and southeastern Virginia to the Rio Grande. It subsists chiefly on fishes and frogs, which it pursues with the greatest speed in the water. Eight or ten young are produced annually. The moccasin in captivity becomes tame, good-natured and sluggish; it is fed small rabbits, rats, birds, fishes and frogs.

MOCK'ING BIRD, an American songster famous the world over for the melodious quality of its singing notes and its marvelous ability to imitate the sounds of other birds. One bird naturalist, L. M. Loomis, records that he heard a mocking bird of South Carolina imitate the notes of thirty-two different species of birds during a period of ten minutes. Some mocking birds, however, are quite lacking in this power of imitation. The lovely music furnished by this national song bird of the United States is beautifully described by Longfellow in the following lines from *Evangeline:*

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Then from the neighboring thicket the mocking bird, wildest of singers,
Swinging aloft on a willow spray that hung o'er the water,
Shook from his little throat such floods of delirious music,
That the whole air and the woods and the waves seemed silent to listen.

Nature, though lavish in her gifts when she created the throat of the mocking bird, denied it a garment of brilliant hue. The ashy-gray coat, darker wings and tail, white outer tail-feathers and grimy-white breast constitute a modest garb indeed. The bird is from nine to eleven inches in length, and is delicately and beautifully proportioned. Male and female are almost alike in coloring, the female having a little less of white in her plumage. These birds range from eastern Nebraska, southern Iowa, Illinois, Indiana, Ohio and Maryland south to eastern Texas, southern Florida and the Bahamas, but are found in greatest numbers in the Southern states.

THE MOCKING BIRD

The nest is built in thickets, low trees or bushes, and contains four to six pale greenish-blue or bluish-white eggs. In the winter the mocking bird feeds on the berries of the holly, smilax and myrtle, but its food during the nesting season is chiefly insects and worms. If taken captive when young this bird becomes easily accustomed to cage life. E.T.S.

MODE. *Mode* means *manner,* and the mode of a verb is that particular form from which we learn its manner of asserting—that is, whether it is stating an actual fact, giving a command, or expressing a doubt, wish, possibility or mere supposition. The word *mood* is often used.

Three English Modes. *Indicative.* When we say, "She sings," "She cannot sing," or "Is she singing?" the verb either states a fact or asks a question as to a fact. It is said to be in the *indicative mode.*

Subjunctive. When we say, "You would admire her voice if she were singing her best," the verb *were singing* expresses what is only a supposition, for it is clear from the sentence that she is not singing her best. When Shelley, addressing the skylark, wrote:

Better than all treasures
That in books are found,
Thy skill to poet were, thou scorner of the ground,

he was also expressing a supposition, *were* being equivalent to *would be.* When Lady Macbeth said, "Now good digestion wait on appetite," she was expressing a wish. In such constructions as these the verb is said to be in the *subjunctive mode.*

In this mode the present indicative forms of the verb *to be—I am, you are, he is*—become *(if) I be, (if) you be, (if) he be*—plural the same; the past indicative forms—*I was, you were, he was*—become *(if) I were, (if) you were, (if) he were.* In other verbs it is only in the third person singular of the present tense that the root-form of the verb in the subjunctive differs from the indicative, *he calls* becoming *(if) he call.*

Imperative. When we say, "Sing louder," or "Lead us not into temptation," the verb expresses a command or an entreaty, and is said to be in the *imperative mode.* Its subject is always *thou, you* or *ye,* generally understood, and its tense always present. These three are the only true modes in English grammar.

So-Called Potential Mode. Some grammarians recognize a potential mode, in which they include those forms of the verb that employ different auxiliaries to express ability, possibility, necessity and the like. These uses are illustrated in the following sentences: She *can* or *could* sing (ability); she *may* or *might* sing (possibility or liberty); she *must* sing to keep in training (necessity); she *should* sing every day (obligation); she *would* sing if she were asked (willingness); she *would* sing in spite of her cold (determination).

Present Status of the Subjunctive Mode. We hear a great deal nowadays to the effect that the subjunctive mode is becoming obsolete and will soon be dropped from the language. Yet, in spite of the fact that it is not now used nearly so much as formerly, its forms must be learned by every one who makes any pretension to speak correctly. There are certain cases, as has been explained, in which there is no question as to the necessity of using the subjunctive. There are others in which the subjunctive, though not insisted upon, helps the writer to express fine shades of meaning that it would be impossible to bring out in any other way.

MODENA, *maw da'nah,* a city in Northern Italy lying in a fertile plain between the Secchia and Panaro rivers, about twenty miles south of the Po River; it is the capital of the province of the same name. Modena is the ancient Mutina that the Romans captured from the Boii in 215 B.C. It was almost wholly

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destroyed by the Huns in the fourth century, and the ravaging Lombards later completed its devastation. In the eleventh century it was refounded by Mathilda of Tuscany, who began the construction of its splendid cathedral. The later Dukes of Tuscany built several fine palaces which are now used as schools, museums and government buildings. Modena has a small trade in linen, silk goods and iron, but derives its main importance from its schools, art gallery, palaces and churches. Population of city and suburbs, 1914, 75,000.

MODERN TENDENCIES IN EDUCATION. See subtitle, in article EDUCATION, page 1938.

MODJESKA, *mah jes'ka,* HELENA (1844-1909), a noted Polish actress who won distinction in Shakespearean and other rôles. She was born in Cracow, and at the age of seventeen married Modrzejewski, from the contraction of whose name she was known professionally. She made her first appearance in 1861, in an amateur performance in her own country. Her husband died in 1865; three years later she married Count Bozenta Chlopkowski and one year thereafter became the star of the Imperial Theater of Warsaw. In 1876, owing to political difficulties, she left her native country for the United States, and in the following year made her first American professional appearance, in San Francisco. Her success was immediate. Though she never used the English language with ease, her great natural gifts gained for her a foremost rank in tragic rôles. She starred with Edwin Booth in 1883, and remained well beloved and honored until her death. Her favorite impersonations were Juliet, Rosalind, Camille and Mary Stuart.

HELENA MODJESKA

MODOC, *mo'dok,* a small group of Indians, closely related to the Klamath tribe, and living originally on the rich lands about Lake Klamath and the Lost River Valley, in northern California and southern Oregon. Their name means *aliens,* and it was applied to them by a neighboring tribe. Their bitter struggles against the white settlers and their raids upon neighboring tribes for slaves earned them the reputation of being a hostile, warlike people. The women were expert basket weavers. Their homes were mud-covered huts built of timbers, sometimes well hewn. After a number of treacherous dealings on both sides these Indians were subdued by United States troops and confined on the Klamath Reservation in Oregon and the Indian Reservation in Oklahoma. They number less than 300. See INDIANS, AMERICAN.

MO'GUL, the Arabic and Persian form of the word *Mongol* (see MONGOLS).

MO'HAIR, the name given to the hair of the Angóra goat, a native of Asia Minor, and to a lustrous, durable material made from it, sometimes called *alpaca.* Except in rare cases, the natural color of the hair is white, and it lacks the felting properties of wool. No fabric excels mohair in durability, and because of this fact it is largely employed in the manufacture of material which is subject to hard usage, as in furniture and railway plushes. The luster is so enduring that no amount of dyeing or washing will dim it. Many mixtures are made of mohair and silk, and numerous imitations are made of wool and cotton for women's apparel. Mohair was originally manufactured in the East and only small quantities were exported, but now it is produced in all parts of Europe and America.

MOHAMMED, *mo ham'ed* (about 570-632), an Arabian, founder of the religion known in the West as *Mohammedanism,* in the East as *Islam.* He was born of poor parents, whose home was in Mecca, and whose members were of the powerful tribe of Koreish. His father died while Mohammed was a baby, and his mother, following a custom of the time, gave the child to a Bedouin nurse, to be raised in the desert. He was subject to attacks of epilepsy, and after three years was returned to his family as one possessed of demons. His grandfather adopted him, but soon died, and the child was again adopted, this time by his uncle, Abu Talib, a thoroughly good man who was destined to be one of Mohammed's most helpful friends. With him the boy went on fine, long journeys with the caravans through Arabia and Syria. When he was twenty-five he began service for a wealthy widow, Khadija, whom he soon married, although she was about fifteen years older. He successfully took care of her business, managing her merchant caravans, and becoming known as an honest, upright man of good judgment.

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Mohammed, like most great leaders and teachers, was a product of the conditions of his time. Ever since the days of the Babylonian captivity there had been Jews scattered throughout Arabia who worshiped one God, Jehovah. The teachings of Christianity were being slowly spread in the East. Owing to the influence of Judaism and Christianity there was a strong religious unrest in Arabia, and many were turning from idolatry to find a purer belief. It had been Mohammed's custom from boyhood to spend a great deal of time alone, thinking upon religious subjects, and when he became older he spent an entire month each year alone on the mountain Hira, near Mecca. When he reached his fortieth year he declared himself to be a prophet and his writings of the *Koran* to be inspired revelations of divine will, entrusted to him through the angel Gabriel.

That he was strongly influenced by Judaism is shown by many of his teachings, such as the unity of God and the power of prayer and fasts; the influence of Christianity was probably less strong, though he taught the prophetic mission of Christ, admitting it to be second only to his own in importance. He retained some of the forms and teachings of the old idolatry. In Mecca was an ancient temple, the *Kaaba,* dedicated to the worship of the god Hobal, and Mohammed taught the sanctity of this place and the ceremonies of the pilgrimage to it. His preaching against idols brought unpopularity, and temporarily he had to leave Mecca in flight to save his life, but he soon returned.

At this time, about 621, his wife, one of the most faithful converts to his faith, and his uncle, both died. Again he left Mecca, this time going to Taif in a vain effort to better his broken fortunes. He was compelled to return to his own city, where he soon gained the converts which gradually brought the turning point in his career. These men were from Yathrib, an important city north of Mecca, which had been a home of Judaism for many years. Here the new faith was kindly received and it spread rapidly. In course of time his popularity in Yathrib was assured, and he, with about 150 of his followers, went in 622 to that city, which became known as Medina, *the city of the Prophet.* This flight, or *Hegira,* is the event which marks the beginning of time as reckoned by Mohammedans. It was a very important circumstance in the life of the new religion.

Up to this time Mohammed had held an humble place indeed in his world, but after entering Yathrib his position became one of power and influence. Soon after he became established there he claimed to have received divine permission to spread his faith by means of warfare, and he gradually won all of Arabia. His missionaries were sent to Khosen II, of Persia, to the Emperor Heraclius of Byzantine, to the king of Abyssinia and to the governor of Egypt. They were not received in Persia, which event led to the first war between the Moslems and the Christians. At the time of his death plans were being made for the conquest of Syria and war with the Roman Empire. He named no one who should succeed him as leader of Islam, but suggested two, between whom the loyalty of Mohammedans was divided.

Mohammed was an Oriental, no better, no worse than the most of his followers. He was not an idealist, and his creed made few severe demands on belief or conduct. His leadership was kindly to his friends, ruthless to his foes. He understood human nature and especially that in the part of the world in which he lived. To-day his followers, 250,000,000, are greater in number than the followers of any other religion. The religion he founded is described under its title, MOHAMMEDANISM. E.B.H.

Consult Sell's *The Life of Mohammed* and references given in the article MOHAMMEDANISM.

MOHAMMEDAN ARCHITECTURE. Practically every new style of building is the result of some previously developed style or styles modified to express the needs and ideals of a certain people. Especially is this true of Mohammedan architecture. As a result of conquests beginning in the seventh century, the Saracens came to know and use the architectural forms of parts of the Byzantine Empire, Syria, Persia, Egypt, Asia Minor, Northern Africa and Spain. Influenced by their creed, which forbade representation of any living object, their Oriental love of ornamentation and color expressed itself in the most elaborate surface designs of geometric patterns. In some instances, as the alabaster screens in the Taj Mahal (which see), these patterns were openwork designs.

The minaret (which see) was also a direct result of the Mohammedan religion. This is a tall slender tower of many stories, each surrounded by a balcony, from which the muezzin calls the people to prayer. The Saracens developed the bulbous dome, often brightly col-

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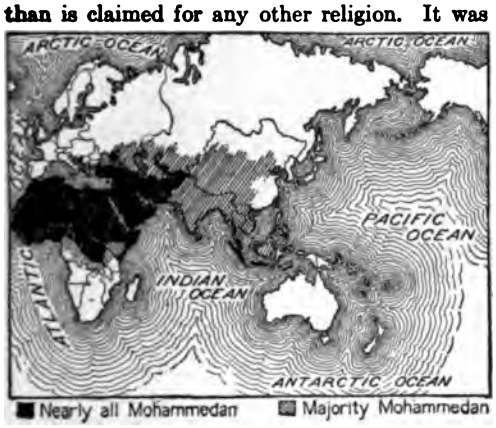
ored, and the horseshoe and stalactite arches. The domes were first built only over tombs, but later, over the prayer halls also, as in the Aksa Mosque and the Dome of the Rock at Jerusalem. In the mosques (which see) the many pillars were usually small in diameter. Mohammedan architectural forms included mosques (by far the most frequent and familiar), mausoleums (tombs), minarets, klans (inns), hospitals, bazaars (markets), and a few palaces.

Mohammedan and Indian architecture combined to produce one of the most exquisite buildings in the world, the Taj Mahal. The Alhambra (which see), so beautifully described by Washington Irving, is an expression of Mohammedan and Spanish architecture, and the old Christian Church of Saint Sophia has the Mohammedan characteristic of many minarets.

MOHAMMEDANISM, *mo ham' e dan iz'm,* the name of a religion founded by Mohammed, about 600 A. D., and having at the present time about 250,000,000 followers, a greater number than is claimed for any other religion. It was



MOHAMMEDAN COUNTRIES

In addition to the areas shown above, there are about 20,000 Mohammedans in the United States and Canada and 10,000 in Dutch Guiana.

called by Mohammed *Islam,* meaning *resignation.* Islam as taught by Mohammed was a combination of the teachings of idolatry, Judaism and Christianity, and the conclusions of a wise and experienced student of human nature. Understanding the Oriental mind, he made few demands unlikely to be easily met; the white heat of religious zeal was satisfied by the exalted conception of the God of the Jews, and fasts and sacrifices which were enjoined were followed by revels.

The teachings of Islam contained in the *Koran,* the bible of Islam, may be divided into the two groups, *faith* and *religion,* or works. The fundamental doctrines of faith were found in the Pentateuch, Psalms and the Gospels, parts of the already existing Hebrew Bible. These were adapted by Mohammed and were the basis of the *Koran.* The *Koran* teaches faith in God and in angels, belief in resurrection and final judgment, and in the doctrine of predestination. To these Hebrew and Christian beliefs the *Koran* adds the idolatrous faith in good and evil spirits or genii, fairies, giants and fates. As the *Koran* was claimed to be the latest and truest expression of divine will, so Mohammed's importance exceeded that of all the former prophets, among whom were included Christ, disclaimed by Mohammed as the Son of God.

After the death of Mohammed students and devotees of his faith explained and added to many of his teachings, meeting in his spirit so far as possible the demands made by new conditions. In this way there came into existence a vast amount of teaching, including Mohammedan law, which did not come from the prophet. The doctrine of fatalism was also emphasized and enlarged by later writers.

The *Koran* teaches four cadinal works, prayer, almsgiving, fasting and a pilgrimage to Mecca. Prayers are to be said at five appointed times every twenty-four hours. They consist of lines from the *Koran,* praise and thanksgiving, and to some extent, petition. Certain prescribed washing (with sand in the case of the Bedouin far from water) must be performed before each prayer. The place on which the suppliant kneels must be clean, and the use of the prayer rug is a result of this teaching. Almsgiving once consisted of a legal tax and a voluntary offering; there was so much objection to the first that it was in time abandoned.

Fasting is required during the month of Ramadan, the ninth month of the Mohammedan calendar, which is calculated upon phases of the moon. To this is due the fact that Ramadan does not occur at precisely the same season from year to year. When the fast comes at the hot time of year, the hardship is very great. People for whom it might be too severe, as sick persons, are excused. Only during the daytime is the fast required, and at night the privilege of breaking the fast often results in revelry and excesses. At the end of the month a feast of several days duration is observed.

The fourth duty required of the Mohammedan is a pilgrimage to Mecca. Mecca is the sacred city, being the birthplace of Mohammed; in it is the old shrine, the *Kaaba,* sacred

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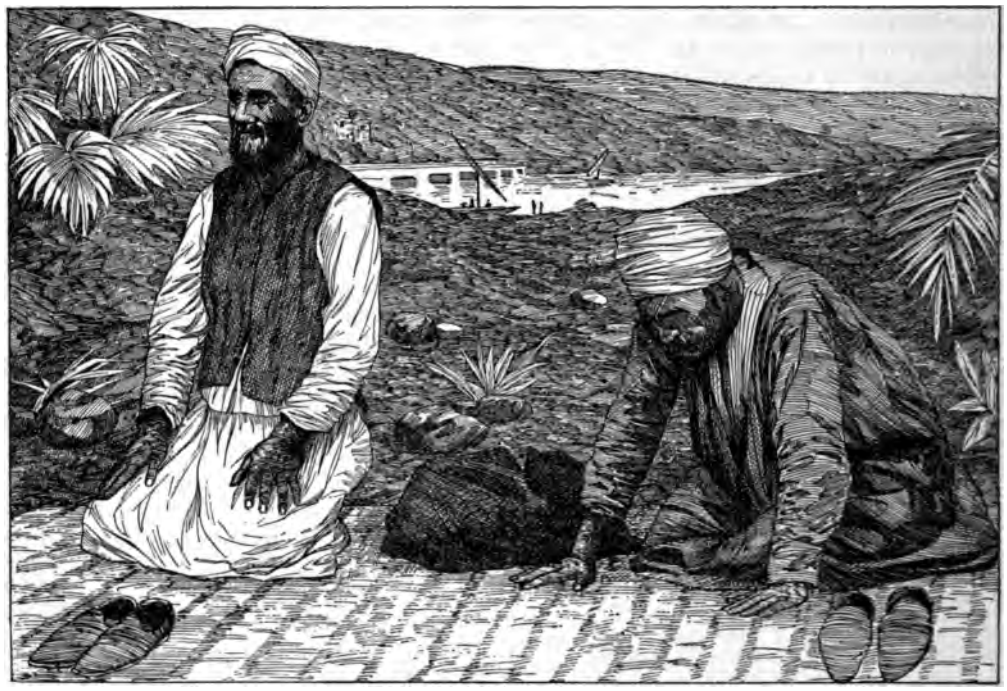
to idolaters before the time of Mohammed, one of the ancient objects of worship and a place of importance in Islam. The pilgrimage to Mecca may be made at any time of year. The twelfth month, however, is known as the special month of pilgrimage. Then there are observed certain rites and ceremonies not observed at any other time.

The Koran teaches the sanctity of marriage according to Oriental standards. Polygamy is allowed, though not now generally practiced. Murder, forbidden in general, is punished according to circumstances. The vendetta, or blood feud, is common and sanctioned among Mohammedans. The one who kills an infidel, a follower of a different faith, is splendidly rewarded in the life beyond the grave. Infidelity to Islam is to be punished by death. All those slain in what are called Holy Wars are martyrs and obtain martyrs' rewards.

The Koran forbids drinking of intoxicating liquors, gambling, taking of usury and the making of an image of any living object, man or beast.

It has long been the fear of nations that Mohammedans might bring about a Holy War against the followers of all other faiths, a fear which has probably not been realized because of dissensions among Mohammedans. After the death of the prophet his followers were divided by those contending for the place of highest authority. This has been a source of great weakness in Islam. The improbability of unified action and the better understanding and sympathy among men that has come with the passing years have very much lessened the danger of a Holy War. E.B.H.



MOHAMMEDANS AT PRAYER

Whether alone in the desert or on a crowded street, the devout Mohammedan observes a strict compliance with devotional commands. Thirteen attitudes are required before his prayer is fully offered. He must face towards Mecca, must remove his shoes and must prostrate himself on his prayer rug.

Consult Margoliouth's *Mohammed and the Rise of Islam;* Zwemer's *Arabia.*

Related Subjects. The following articles in these volumes will be of interest in connection with a study of Mohammedanism:

Bible	Koran
Christianity	Mecca
Fatalism	Medina
Hegira	Mohammed
Islam	Predestination
Kaaba	

MOHAMMED V (1844-), twenty-ninth sultan of the Turkish Empire since the conquest of Constantinople (1453), and the thirty-sixth in male descent of the House of Othman. Mohammed V is the third son of Abd-ul-Medjid.

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On April 27, 1909, he was chosen by the National Assembly to succeed his brother, Abd-ul-Hamid II, who had been deposed by the "Young Turk" army led by Midhat Pasha, because he failed to introduce reforms as required to do by the Treaty of San Stefano. The Cabinet of the government was reconstructed after the assassination of Grand Vizier Mahmud Shevket Pasha, and the present Turkish government came into power on January 24, 1913. Mohammed V cast his lot with the Germanic powers in the War of the Nations, entering the conflict in 1915 against France, England and Russia.

MOHAVE, *mo hah' vay,* a tribe of Indians of notably fine physique and appearance, living along the lower Colorado River in Arizona and California. They cultivate patches of corn, pumpkins, melons and beans and also gather the natural mesquite beans for food. From the river they take a few fish. Their houses are low-walled huts with flat tops, built of brush-like mats between four corner posts. They make and break camp easily and between crops move about at will. They make splendid pottery. This and their own bodies they decorate with artistic designs in natural colors. The dead are cremated. The Mohave live on the Colorado River reservation in Arizona. See INDIANS, AMERICAN.

MO'HAWK, the oldest, and, during colonial times, the most powerful tribe of the Iroquois confederacy, or Five Nations (see FIVE NATIONS). Their territory, when white men first knew them, was along the valley of the Mohawk River, in eastern New York; from there it extended northward to the Saint Lawrence and southward to the east branch of the Susquehanna. Just east of the Mohawk across the Hudson were the Mohican (which see). They were the first tribes to come in contact with the Dutch and English settlers; with these they traded and received firearms in return for pelts. Their central position exposed them to all the waves of warfare during the stormy colonial period, and by 1677 their villages were reduced to five. They joined the British in the American Revolution, and at its close most of them went to Canada, where they were established by the government on reservations. See INDIANS, AMERICAN.

MOHAWK, a river of the United States which was regarded as the gateway to the West in the War of Independence. It rises in Lewis County in northern New York, runs nearly southeast to Utica, and after many curves enters the Hudson at Cohoes, about nine miles above Albany. It is the largest tributary of the Hudson, with a total length of about 150 miles, and its valley is remarkable for fertility and beauty. The Erie Canal runs close to it as far as Rome, as do the New York Central and West Shore railroads. It is an important source of water power for numerous manufacturing industries, having in the upper part of its course rapids and falls which afford excellent motive power. The chief cities along its course are Rome, Utica, Ilion, Little Falls, Herkimer, Fort Plain, Canajoharie, Fonda, Amsterdam, Schenectady, Albany, Mechanicsville and Cohoes.

The Mohawk Valley was the home of the Mohawk and other Indian tribes, as well as the headquarters of the Five Nations (which see), and the atrocious massacres of Cherry Valley and Schoharie occurred there. At the outbreak of the Revolutionary War an effort was made by both English and Americans to secure possession of it, and the valley was the scene of many battles.

MOHICAN, *mo he' kan,* or **MAHICAN,** one of the most powerful tribes of the Algonquian family, who dwelt along the Hudson River in New York. They were bitter enemies of the Mohawk (which see), with whom they were in almost constant warfare, and whose attacks led them to move their council fire to the site of the present Stockbridge, Mass. Gradually losing their tribal identity, a remnant, known as the Stockbridge Indians, are now settled upon a reservation near Green Bay, Wis. The Mohicans were renowned fighters, resorting to craftiness and deceit, fighting from ambush and in the dark rather than in the open. Cooper has told their thrilling story in *The Last of the Mohicans.* They were a well-built people, strong and wiry. Their curious houses, sometimes 180 feet long and nearly twenty feet wide, were made by planting two parallel rows of saplings, whose tops were bent over to form the roof, the outside being covered with split poles and bark.

A closely-related tribe, the *Mohegan,* whose name is a dialectic form of Mohican, lived in Connecticut along the Thames River. By treaty with the English they were allowed to remain in their old home, but intermarriage with negroes and whites became so common among them that not a full-blooded Mohegan remains.

MOKI, *mo ke,* a name sometimes applied to the Hopi Indians (which see).

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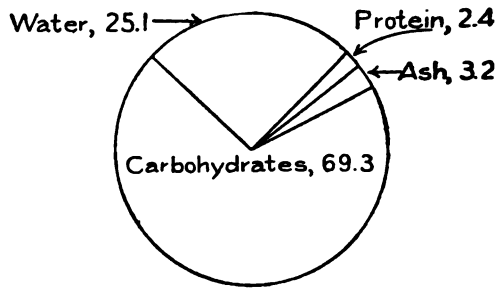
MOLASSES, *mo las' ez,* from the French *molasse,* meaning *flabby,* is a dark brown, sometimes yellowish, uncrystallizable substance, having the appearance of a thick, sticky syrup. It is one of the by-products of sugar cane manufacture, and is extensively used in cooking and in making confectionery. *Molasses* and *treacle* are sometimes used as synonymous terms, but the latter properly refers to the syrup obtained in sugar refining.

How It Is Made. Molasses is the liquid which in the process of manufacturing sugar is separated from the mass containing the sugar crystals, this crystallization being brought about by two methods, the "open kettle" and the vacuum pan. The former consists of boiling the juice of the cane in circular or rectangular open pans having steam coils. After several boilings the juice is reduced to the form of syrup, and this in turn to a stiff mass of syrup and crystals, called the *massecuite.* The massecuite is drawn off into hogsheads and the molasses seeps out through perforations in the bottom. Molasses made in this way is of excellent flavor, but as this process has been largely replaced by the vacuum-pan methods, the product described above is not found on the market in large quantities.

By the other method, the one which is generally used in the large modern sugar factories, the massecuite is obtained through a series of boilings in vacuum pans. It is then conveyed to a mixer, where it is thoroughly stirred, the crystals and syrup being kept from separating by a set of revolving paddles. The massecuite is then conveyed to cylindrical vessels (known as centrifugals), having walls of copper gauze sufficiently fine in texture to prevent the crystals from passing out through the meshes. Each vessel contains a shaft which makes about 1,000 revolutions a minute, and in the course of this rapid motion the molasses is separated from the sugar crystals and thrown out through the perforations in the gauze.

The molasses thus obtained contains about 50 per cent of sugar, and is usually reboiled until all of the crystallizable sugar has been removed. In Louisiana, however, some of the product fresh from the centrifugal is diluted with water and sold to local customers as table molasses, and to the manufacturers of glucose syrup. The first reboiling produces "second sugar" and "second molasses," the second reboiling "third sugar" and "third molasses," and so on. The refuse molasses obtained through several boilings is utilized to some extent in feeding stock, in fertilizing and in the distillation of rum. "Third molasses" is mixed with glucose to make a table syrup, and the so-called New Orleans molasses is largely glucose flavored with molasses.

The United States Department of Agriculture has ruled that standard molasses shall not con-



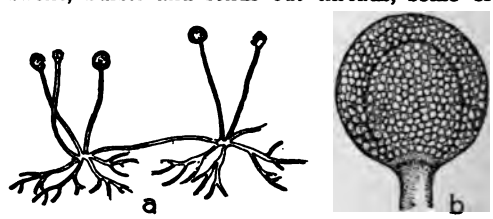
FOOD VALUE OF MOLASSES

The fuel value is 1,290 calories per pound (see CALORIE).

tain more than 25 per cent of water nor more than 5 per cent of ash. See FOOD, subhead *Chemistry of Foods.*

Production. The production of molasses is confined to the sugar cane countries of the world, chief of which are Cuba, Java, Hawaii, the United States, Porto Rico, Brazil, Peru, Mauritius, Queensland, Argentina and the Philippine Islands. The greater part of the molasses made in the United States comes from Louisiana, which has a yearly output of about 23,000,000 gallons. B.M.W.

MOLD, the furry covering that appears on food left in a damp place, or on decaying matter, is a minute vegetable growth. Mold starts from a dustlike particle called a spore, which swells, bursts and sends out threads, some of



MOLD

(*a*) Black mold; (*b*) greatly magnified spore case, or *sporangium.*

which are like roots, others like branches. Each branchlike thread develops a *sporangium* or spore case, no larger than a pinhead, in which thousands of spores appear. When the cases break open these spores float away with the dust of the air, ready to reproduce themselves in any damp place. Mold will not grow in cold air, and will wither in sunlight. The bread

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mold and green cheese mold are its most familiar forms. The germs of mold, as of other fungous growths, may cause disease if taken into the body.

MOLE, a muscular little animal, a builder of underground homes, and the farmers' friend because of its destruction of grubs and worms.

THE MOLE
A cross section of his underground home is shown. Chambers may extend many feet in various directions.

Though it sometimes damages crops through the disturbance of delicate roots, it never eats vegetable matter. Little surface hills of earth which have been thrown up in the process of tunneling disclose the presence of moles underneath.

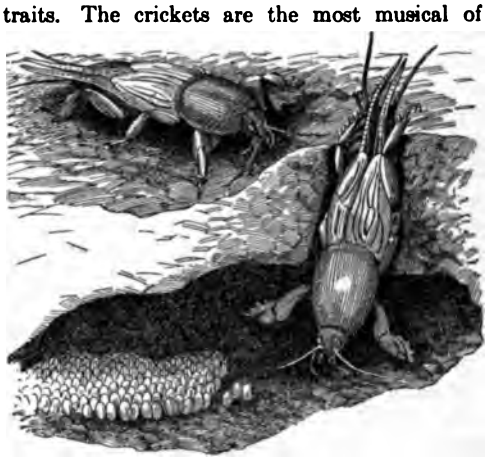
Common moles are found from Canada to Florida and throughout Central Europe. They are thickset, five or six inches long, with narrow, slender muzzles, small, fur-hidden eyes, no exterior ears, short, naked tails and short, powerful legs. The commercially valuable fur is thick and soft, and the hairs may lie either forward or backward. Bluish-gray moleskin is most in demand by furriers, but black, brownish-black and pale shades are not rejected by garment makers. Undressed pelts are valued at only a few pennies, but the expense of working them brings the price of a small moleskin cap to $15 or $25. Moleskin is light in weight, yet warm, but its wearing qualities are poor.

Going down to the homes of these greedy, insect-eating animals, wonderful structures are found. Loose earth is fashioned into such hard central chambers and tunnels in all directions that heavy rainstorms do not destroy them. In the winter the little animal avoids the frost by tunneling deep down into the earth, sometimes four feet below the surface. In early spring four or five baby moles are produced at a birth, and are housed in a warmly-lined central chamber. Sometimes a second brood appears in autumn. Young moles quickly reach their full size. These animals like water, and they swim well. They are always hungry, and if deprived of food for ten or twelve hours will die.

One American species of mole is called the *star-nosed mole* (see subhead below). Other burrowing, insect-eating animals are sometimes called moles, such as the shrews and the golden moles of South Africa. See SHREW.

Star-Nosed Mole. This little creature, which is not quite nine inches long, is so called because it has a starlike fringe of cartilage about the nose. It is dark brownish-gray, paler beneath, and has a long hairy tail which is sometimes thickened at the base. It ranges throughout Northern North America as far south as the Southern United States. The star-nosed mole is fond of life near and in the water, so one may look for its tunneled home in the soil of swamps and along the borders of brooks and ponds. The opening of its burrow is often beneath the water. In the winter it burrows deep down in swampy places, out of the reach of frosts, and sometimes swims beneath the ice of frozen brooks in search of water insects. It is a true night prowler, and in the daytime prefers its underground dwelling to the sunlight, for it does not even emerge at noon for a sun bath. M.S.

MOLE CRICKET, a large insect belonging to the family of crickets, but which combines some of the habits of the mole with its own special traits. The crickets are the most musical of



THE MOLE CRICKET
Showing underground home and egg chamber.

all the families of insects, and even the mole cricket "plays a tune" with its wings, although the sounds are not usually considered cheerful. The insect is about one and a half inches long, of a velvety-brown color, with short front legs,

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not unlike those of a mole, and usually with short wings, which, however, may be entirely absent. These crickets spend their lives underground, and travel in burrows of their own digging. Their food is larvae and earthworms, and they destroy the roots of plants. The female lays from 200 to 400 eggs. In Porto Rico these insects are called *changa,* and there they cause great damage to vegetation and crops.

MOLECULE, *mol' e kule,* in theory, the smallest physical unit into which matter may be divided. A molecule of water, for example, is the smallest possible particle which retains its identity as water. The molecule, which cannot be further divided by crushing or grinding or by the application of any mechanical or physical force, can be broken up by chemical action into the parts which unite chemically to form it; these parts are known as *atoms* (see ATOM). Sometimes the atoms are all of one kind, in which case they unite to form an *element;* oxygen, for example, is an element, because its molecules are formed by the union of similar atoms. Many times, however, atoms of different kinds unite to form a molecule, and the result is a *compound;* water is a compound, since each molecule of water is made up not of water but of atoms of oxygen and hydrogen. These atoms are in the proportion of two atoms of hydrogen to one atom of oxygen; this combination is symbolized as H_2O. In the composition of matter, atoms unite chemically to form molecules, and molecules unite physically to form *mass.*

A molecule, of course, has never been seen, even under the most powerful microscope. This is not surprising when one stops to consider that the molecules that unite to make up a volume of gas as large as the head of a pin are thirty million times as numerous as the people who inhabit the globe. In no laboratory, then, has a molecule ever been physically separated from its fellows. Scientists, however, need a unit in conducting their work, and so they have imagined this tiny, ultimate bit of matter and called it a molecule.

Molecular Force. Molecules are held together by a mutual attractive force not unlike that of gravitation (which see). As with the sun and planets, this force acts most strongly when the molecules are nearest together. In a *solid* the molecules are so close together that they can move very little, and the definite form of the body is not readily changed. In *fluids* the molecular force is less; the molecules change their relative position easily, and the substance has no definite shape. In *gases* the force is so slight that the molecules tend to fly apart and expand as widely as possible. Water is a substance which appears in all three states; as a solid (ice), as a liquid and as vapor (steam). Heat affects the force with which the component molecules attract one another; the degree of heat present determines whether water shall have a fluid, a solid or a gaseous form.

Molecular Weights. Gases, like solid bodies, have weight. The relative weight of the molecules composing them is determined by weighing like volumes of two gases and assuming that they contain the same number of molecules. A given volume of hydrogen is lighter than a like volume of any other known substance; consequently it has been found convenient to adopt it as the unit of measurement and call its molecular weight 2, since each molecule is composed of two atoms whose weight is regarded as 1 each. Other gases are said to be so many times heavier than hydrogen. In the study of chemistry, many other ways of determining molecular weight are given. Some approximate molecular weights follow:

Hydrogen	2	Nitrogen	28
Oxygen	32	Salt	58.5
Water	18	Caustic soda or sodium hydroxide	40
Sulphur	64		
Ozone	48		

See CHEMISTRY; ATOMIC THEORY. G.L.

MOLIÈRE, *mo lyair'* (1622-1673), the name by which the greatest of French dramatists, JEAN BAPTISTE POQUELIN, is known in the literary world. Of the dramatists who have lived since the beginning of the modern period he ranks next to Shakespeare, and in his power to combine humor and pathos is often compared with the great English genius. Molière distinguished himself as a writer of social comedy. That is, he gave an accurate picture of the society of his day, satirizing in brilliant and vigorous dialogue the weaknesses and foibles of the men and women about him. The humorous effect of his plays is obtained through the portrayal of character rather than

MOLIÈRE
Among modern dramatists he ranks next to Shakespeare, but the average English reader knows little of him.

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through ludicrous situations; Harpagon, the chief figure of his masterpiece, *The Miser* (L'Avare), is one of the most striking creations in the world's dramatic literature.

Molière was both a dramatist and an actor, and began his career as manager of a theater which he helped to build. After the failure of this venture he joined a band of strolling players who gave performances in the rural towns. His first comedy, *The Blunderer,* was produced seven years later, in 1653. He continued his work as a writer and actor until the last year of his life, and it can truthfully be said that he died in the harness, for his death was brought about through his impersonation of a character in his last play, *The Imaginary Invalid.* In this he had to indulge in a violent fit of coughing, which caused the bursting of a blood vessel. Among his best comedies are *The School for Women, Tartuffe, George Dandin, The Misanthrope* and *Doctor in Spite of Himself.*

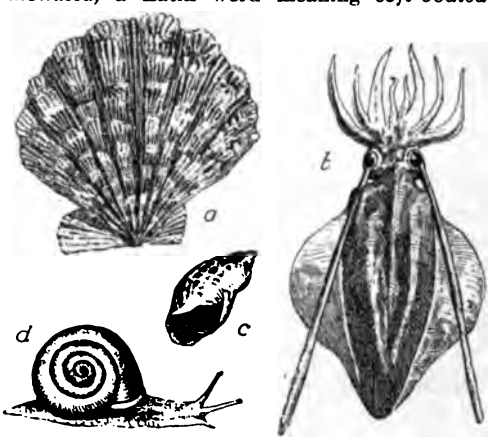
Consult Chatfield-Taylor's *Molière;* Matthews' *Molière, His Life and His Works.*

MOLINE, *mo leen',* ILL., a manufacturing city in Rock Island County, in the northwestern part of the state. It is situated on the Mississippi River, at the point where it receives the waters of the Rock River, and on the Hennepin Canal. Exceptional transportation facilities are offered by water and rail. The Chicago, Rock Island & Pacific, the Chicago Burlington & Quincy and the Chicago, Milwaukee & Saint Paul railways serve the city. Chicago is 179 miles east. Rock Island, the county seat, joins Moline on the west, and Davenport, Iowa, is across the river from Rock Island. These three cities, locally called the "tri-city," are closely connected by electric railways, ferries and bridges; they are regarded as one big community with a total population of nearly 100,000 (1916), that of Moline being 27,451 (estimated); of these 5,000 are Swedes and 3,000 are Belgians. Its population in 1910 was 24,199. The area of the city is five and one-half square miles.

In the channel between Moline and the island of Rock Island, in the Mississippi River, dams have been built to develop water power for the use of manufacturers. Extensive coal fields in the vicinity also contribute to the industrial development of the city. Moline is famous for the manufacture of agricultural implements, particularly steel plows and corn planters. About 3,500 people are employed by two plow companies, the annual output being valued at $32,000,000. Beside these the city has three automobile factories, at least one of them (Velie) with a large output, and it also manufactures elevators, scales, boilers, pumps, furniture, organs and foundry products. East of the city limits are located the large yards and machine shops of the Chicago, Rock Island & Pacific Railway. Moline is an important distributing point for lumber, grain and machinery. The most notable buildings are a $150,000 Federal building, erected in 1910; a city hall, constructed in 1913 at a cost of $170,000, and a $135,000 Y. M. C. A. building. In addition to its public school system, with a library and two high schools, it has a business college and a Carnegie Library. Outdoor recreation is provided by Sylvan, Deere-Stephens, Riverside and Prospect parks. Interesting features of the vicinity are Black Hawk Watch Tower, Campbell's Island and the United States arsenal on Rock Island.

The first settlement was made in 1829. In 1843 the town was platted by a mill company, who called it Moline, from the French word *moulin,* meaning *mill.* It was incorporated as a town in 1848, as a city in 1872, and it adopted the commission form of government in 1911. To the east is East Moline, a rapidly-growing manufacturing suburb. O.F.H.

MOLLUSKS, *mol'usks,* a numerous group in the animal kingdom known to naturalists as *mollusca,* a Latin word meaning *soft-bodied*



MOLLUSKS

(*a*) Scallop shell; (*b*) Tasmanian cuttlefish; (*c*) fresh-water snail shell; (*d*) North American snail.

animals. As the name indicates, all mollusks have soft, boneless bodies. Oysters and clams may be regarded as the most notable of this group. It includes also such curious mailed creatures as slugs and snails, as well as several interesting animals without shells, like the octopus, the nautilus, the cuttlefish and the squid.

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The coat of mail that protects the oyster and numerous other shellfish from the dangers that surround them is secreted by the animal itself and is composed of carbonate of lime, which often has the marvelous iridescent shimmer of the rarest gems. The pearls found in the pearl-oyster are notable examples; the spiral conches cast up by the tide on beach or mud flat show us that many of the humble mollusks dwell in colored houses of more brilliant splendor than any palace decoration. The bodies shut within seem to have a rudimentary structure, but they exhibit, in reality, well-developed systems of nerves and circulation. One of the distinguishing marks of the mollusk is the fact that it uses a lung in breathing—a mere sac, to be sure, but still a lung. This is decidedly inconvenient for such mollusks as live in the sea, for they are obliged to come to the surface occasionally to breathe, while their neighbors, the fish, are equipped with gills that enable them to take the oxygen they need directly from the water.

Mollusks are, on the whole, rather sluggish creatures, which accounts for the habits of the oyster and the clam. The oyster, for example, which is active enough when young, soon attaches itself to a rock and spends the rest of its life in ease, waiting for the tides to bring it the food it needs. The clam is hardly more energetic. It is found in great numbers burrowing in the sand and mud along the seacoasts. Sometimes the clam digger spies its back thrusting up through the mud, when the tide is out. The soft-shell clam, which is easily the aristocrat of its family, digs itself in to a depth of a foot or more. It is conveniently provided with flexible tubelike projections, called *siphons,* which it thrusts up through mud and sand to the surface, sucking down both food and air.

Mollusks having two shells, like the oyster, are called *bivalved;* while snails, which have but one shell, are said to be *univalved.*

Related Subjects. A detailed knowledge of the most important species of these shellfish may be gained from a study of the following articles:

Argonaut	Octopus
Chitons	Oyster
Clam	Scallop
Conch	Sea Lemon
Cuttlefish	Sea Squirts
Gastropod	Slug
Limpet	Snail
Mussel	Squid
Nautilus	

MOLOKAI, *mo lo kah' e,* one of the Hawaiian group of islands, noted principally for its colony of lepers. The island is about thirty-five miles long and eight miles wide, and has an area of 261 square miles. The climate is healthful and agreeable. Lepers from all parts of the islands are sent there by the government, where they are completely separated from the healthy inhabitants. The leper colony is governed chiefly by members of religious Orders of the Roman Catholic Church, who nobly give their services in administering to the spiritual and temporal needs of these unfortunate people. The most prominent among them was Father Damien, who after sixteen years of self-sacrifice died a victim of the disease. The children of the lepers are cared for in an asylum on the island of Oahu. Politically, Molokai is a part of the territory of Hawaii (see HAWAII). Population, 1910, 2,112.

MOLT'ING, the process by which Mother Nature has arranged that birds and beasts may shed their old skins, feathers, shells, hair, claws, beaks or horns, and develop them anew. This change is, of course, for the creatures' protection, since these parts of their bodies are gradually worn out through use, or become in some way unfitted for their needs. On some insects and reptiles, such as spiders and snakes, the outer covering, instead of increasing gradually in size, renews itself completely at certain intervals. An inner layer of cells secretes a fluid which hardens, protecting the newly-exposed body, at the same time shutting off nourishment from the old skin, which dries and hardens, finally dropping away. Birds shed their plumage once or twice a year, and often three times, each complete molt taking from four to six weeks. The feathers fall out one after another in regular sequence, and there is a corresponding renewal of their plumage; the birds, therefore, with few exceptions, are not prevented from flying at such times. The first molt of the season renews the bird's bedraggled winter plumage; the second decks it out for the mating season.

Some mammals, the highest order of animals, shed their hair once a year, usually in the spring; some of the deer family drop their antlers also at that time. Other creatures whose molt is somewhat extraordinary are the lemmings, animals similar to the guinea pig, and the ptarmigans, both of which drop their claws; while birds of the auk family shed the horny parts of their bill (see AUK). Caterpillars usually molt five times before becoming butterflies. See METAMORPHOSIS; also BIRD, paragraph "Moulting," under subhead *Feathers.*

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MOLT'KE, HELMUTH CARL BERNHARD, Count von (1800-1891), a Prussian soldier and military genius, ranking with Bismarck as a builder of the German Empire. He was born at Parchim, and in 1812 enrolled in the Royal Military Academy at Copenhagen. In 1822 he entered the Prussian army as second lieutenant, and in 1835 attained the rank of captain. After serving as adjutant to Prince Henry in Rome he returned to Germany, and in 1857 was appointed chief of the staff of the Prussian army. The full test of his efficiency was made in the Seven Weeks' War in 1855 between Austria and Prussia. The great triumph of his career, however, was the Franco-German War of 1870-1871, which he had foreseen and prepared for; his plans were carried out with remarkable precision. He was made a field-marshal on his return to Berlin from France; Parliament granted him $225,000 and appointed him a member of the upper house for life. The title of count was also conferred upon him.

VON MOLTKE

After the accession of Emperor William II in 1888 he resigned on account of advanced age, and when he was ninety all Germany celebrated his birthday. Moltke was a man of simplicity and of devotion to duty. His writings include essays on Turkish affairs, *The Franco-German War of 1870-1871* and *Moltke's Tactical Problems from 1858 to 1882.*

Helmuth Joannes Ludwig von Moltke (1848-), a nephew of the above, also chose the army for his career. He served in the Franco-German War and upon the outbreak of the War of the Nations in 1914 was expected to take an important part in the conflict. After the Battle of the Marne in August he was superseded temporarily by Von Falkenhayn, and the latter's preëminence was assured in December.

MOLUCCAS, *mo luk'az,* or **SPICE ISLANDS,** a large group of islands belonging to the Dutch East Indies, situated southeast of the Philippine Islands, and having New Guinea on the east, Celebes on the west and Timar on the south. Geographically they are a division of the Malay Archipelago (which see). There are several hundred islands in the group, and they have been in possession of the Netherlands since the beginning of the seventeenth century. They have a combined area of 43,864 square miles, and for purposes of administration are divided into three residences (provinces), Ternate, Amboyna and Banda. These islands are of volcanic origin, high and mountainous, but exceedingly fertile. They produce a great variety of spices (from which they derive the name Spice Islands), fruits, fine woods, birds of paradise, rice and cotton. The chief city and center of trade is Amboyna, on the island bearing that name. Population, about 412,000.

MOMEN'TUM, the quantity of motion that a body has when moving. This quantity depends first on the mass of the body, that is, its size and weight; and second, on the speed with which it moves. A small body, such as a bullet, moving with great velocity, may have a momentum no greater than the momentum of a large body moving very slowly. For example, a four-ounce bird flying at the rate of sixteen feet a second has the same momentum as a two-pound puppy walking at the rate of two feet a second. This principle is usually expressed in the formula: $Momentum = Mass \times Velocity$. The product is expressed in the abstract units of foot-pound-second or centimeter-gram-second in the given direction, which means the momentum of so many pounds or grams of mass moving so many feet or centimeters per second. The unit centimeter-gram-second is that employed in the metric system (which see).

MOMMSEN, *mohm'zen,* THEODOR (1817-1903), a German scholar, teacher and writer, the author of one of the finest historical works ever written, *Mommsen's History of Rome.* At the age of thirty-one he was elected professor of law at Leipzig University, but two years later was removed for political reasons. He then went to the University of Zurich in Switzerland as professor of Roman law, and after two years became professor of history at the University of Breslau. From 1858 until his death he was professor of ancient history in Berlin University. He served

THEODOR MOMMSEN
One of the most profound scholars of Germany in the nineteenth century.

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as deputy in the Prussian Parliament from 1873 to 1882, when Bismarck was at the height of his power. To the latter's policies he was strongly opposed. Mommsen was a famous archaeologist in the field of ancient Roman inscriptions. His *Roman History,* the first volume of which was published in 1854, is considered a standard reference work by American universities.

MONACO, *mon'a ko,* an independent principality on the Mediterranean coast of France, the smallest in Europe, being only eight square miles in area. Up to 1861 it had an area of fifty square miles and included Mentone and

MONACO AND MONTE CARLO
French in language, but Italian in tradition.

Roccabauna. Owing to financial stress, the greater part was at that time transferred to France for about $750,000. It now consists of Monaco, the capital, Condamine and Monte Carlo; the population is chiefly in these three cities. There is very little industrial life; the principal business of the people of Monaco is in connection with the hotels and the gambling resorts, which attract people from all parts of the world.

Winter resorts are maintained on a magnificent scale. The most famous of these is Monte Carlo, the world's most notorious gambling center, with its costly Casino. The splendor of the gambling halls, together with the fascination of the game of chance, has gained for Monte Carlo a world-wide reputation. Large sums of money are being continually lost there, and jewels and estates are mortgaged to satisfy the demands of this insidious pastime. Suicide is common. A syndicate pays so heavily to the Prince of Monaco for its license to gamble that no tax for the support of the government is placed upon the people.

Emperor Otho I, founder of the Holy Roman Empire, ceded this principality to the ancestors of the Prince of Monaco, and the government has since remained in this family. Population in 1910, 19,121.

Consult Smith's *Monaco and Monte Carlo;* Mayne's *Romance of Monaco and Its Rulers.*

MONARCHY, *mon'ar ki,* that form of government in which executive power is vested in an hereditary ruler. The old idea of monarchy was that the power of the ruler should be absolute, a theory which included the doctrine of the divine right of kings. Changes which were largely the result of the French Revolution have brought into existence the term *limited,* or *constitutional,* monarchy, as opposed to *despotic,* or *absolute,* monarchy. When the power of a ruler is limited either by a legislative body or a constitution, or by both, the state is said to be a *limited* monarchy.

Absolute monarchies are fast disappearing. Russia, long an extreme type of despotism, overthrew absolutism in 1917, and even in Turkey the people are beginning to ask for a voice in the government. The people of nearly all European countries live under limited monarchical forms of government; the exceptions, in addition to the two noted, are the republics of France and Switzerland. See GOVERNMENT.

MONASTERY, *mon'as ter i.* See MONASTICISM, below.

MONASTICISM, *mo nas' ti siz'm,* a form of organized and regulated conduct of life, growing out of one of the deepest instincts of human nature—the love of solitude. This craving to be alone has perhaps manifested itself chiefly as an expression of spiritual life. Among Asiatics the instinct has been peculiarly strong. The ancient Oriental philosophies of asceticism and mysticism led men into solitary life as a condition of that almost utter self-effacement which meant escape from the follies of the world and an entering into union with the omnipotent Creator. Among ancient peoples there were probably no hermit organizations, but many devotees of the oldest religions, in China, India, Tibet and Canaan, lived the life of a recluse, either wholly or in part. Before the time of Christ there was in Judea a society called Essenes, whose members lived an organized monastic life.

Christian Monasticism, which began in the second century after Christ, has developed extensively since that time. In the beginning it was due partly to a desire on the part of Christians to escape persecution or the corruption of society, but was largely the result of asceticism, a desire for self-renunciation. Strangely, and yet not strangely, Egypt was the home of

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monasticism, where it was an unforeseen development of hermit life. Among the many solitary travelers up the valley of the Nile was one Saint Anthony, who established himself in an old deserted fort, where he lived in seclusion for nearly twenty years. As others came to know of this saintly man they begged him to be their teacher. He did not effect any sort of organization, but was only the spiritual leader of his followers. They lived alone, or two or

three dwelt together in any convenient hut, doing only such work as was necessary for their daily bread, and giving the greater part of their time to religious devotion. Saint Anthony is known as the father of Christian monasticism.

In the southern part of Egypt about A. D. 315-320, Saint Pachomius not only gathered about him numbers of religious hermits, but organized the first Christian cenobium, or monastery. The members lived together, and the life of each individual of this community was regulated by rules. Saint Pachomius himself was the spiritual leader, or abbot, exercising authority in every matter. About 410 the followers of Saint Pachomius numbered nearly seven thousand. He also founded other monasteries, among them one for women.

Since the invasion of Northern Africa by Mohammedans, these monasteries have gradually decreased until at the present time very few remain, and these are of little importance. With its decline in Egypt, monasticism spread into Syria, Palestine, Mesopotamia, Asia Minor and Armenia. There it took the form of a strange sort of self-denial, of which the penance of Saint Simeon Stylites, immortalized by Tennyson's poem of that name, is a well-known example:

Let this avail, just, dreadful, mighty God,
This not be all in vain, that thrice ten years,
Thrice multiplied by superhuman pangs,
In hungers and in thirsts, fevers and cold,
In coughs, aches, stitches ulcerous, throes and cramps,
A sign betwixt the meadow and the cloud,
Patient on this tall pillar I have borne
Rain, wind, frost, heat, hail, damp, and sleet, and snow.

Saint Basil, who lived during the same period, became known as the father of monasticism in the East through his founding of monasteries in Pontus and Cappadocia. In the early part of the sixth century Saint Benedict reformed the old rules, eliminating Oriental asceticism, made the abbot of the monastery as well as the monks subject to rule, and denied the members the privilege of wandering about from one monastery to another, emphasizing the bonds of their community life and the value of work.

Saint Benedict organized corresponding communities for women, called convents, and placed his sister, Saint Scholastica, in charge of the first. Under the Benedictine rule the monasteries and convents of Europe during the Middle Ages held high the torch of religious faith and were the "cities of refuge" where a troubled world could find sanctuary. In them were preserved the manuscripts of the earliest Christian writings and much of classical and medieval literature.

Some of the most important Orders which adopted the Benedictine rule were the Cluny, Cistercian and Trappist. The Knights Hospitalers of Saint John, the Knights Templar and the Teutonic Knights were military orders growing out of the Crusades against the Mohammedans. The mendicant Orders, the Franciscans, the Dominicans and the Augustinian Hermits, were organized in the first half of the thirteenth century. The Jesuits, the last great Order founded in Europe, became an important agency in preventing the spread of Protestantism and in establishing Church schools for the children of Roman Catholics. The Paulist Fathers were organized in 1858 for missionary work in the United States.

The principal monastic vows are poverty, chastity and obedience. Saint Francis' *Imitation of Christ* and other similar writings of pious monks have been beacon lights to those

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ascetics in private life who have set for themselves the ideal of self-denial. G.W.M.

Consult Workman's *Evolution of the Monastic Ideal;* Morin's *Ideal of the Monastic Life Found in the Apostolic Age;* Wheeler's *Women of the Cell and Cloister.*

Related Subjects. The following articles in these volumes will be of interest in connection with the above discussion of monasticism:

Anthony, Saint	Knights Hospitalers
Benedictines	Mendicant Orders
Capuchins	Mercy, Sisters of
Carthusians	Monk
Charity, Sisters of	Nun
Dominicans	Paulists
Franciscans	Templars, Knights
Hermits	Teutonic Knights
Jesuits	Trappists
Knighthood, Orders of	Ursulines

MONCK, *mungk,* CHARLES STANLEY, Fourth Viscount (1819-1894), a British statesman and colonial administrator, Governor-General of Canada under the Act of Union from 1861 to 1867, and then for two years first Governor-General of the Dominion of Canada. He was born in County Tipperary, Ireland, was graduated at Trinity College, Dublin, in 1841, and was called to the bar in the same year. After practicing law for a decade he became active in politics, and in 1852 was elected to the House of Commons, of which he remained a member until 1859. From 1855 to 1858 he was a lord of the treasury.

Although his public career up to the time he was appointed Governor-General of Canada was short, he had won so high a reputation that the appointment received general approval. Canadian affairs were in a critical state. The union established in 1841 was about to break down, and before Monck had been in Canada more than a year or two the government was practically at a standstill, because no party could remain in power for more than a few months. Monck's tact and reasonableness went far to avoid trouble. Largely through his influence George Brown was induced to set aside his personal feeling against Sir John A. Macdonald and join the coalition Ministry in 1864. Monck strongly approved of the Confederation movement and did everything in his power to assist it. In recognition of his services he was made, in 1866, a viscount in the peerage of Great Britain (previously he had been an Irish peer), and when the Dominion of Canada was organized in 1867 was appointed its first Governor-General. He resigned after two years of service. In 1871 he was a member of the commission which effected the disestablishment of the Irish Church, and from 1882 to 1884 was on the commission to carry out the provisions of the Irish Land Act.

VISCOUNT MONCK

MONCTON, *mungk'tun,* a city in Westmorland County, New Brunswick, and, except Saint John, the largest city in the province. It is 185 miles northwest of Halifax and eighty-nine miles northeast of Saint John. Its location in the southeast corner of the province, near the narrow Isthmus of Chignecto, has made it a railroad center. It is the eastern terminus of the Canadian Government Railways (The Intercolonial and the Grand Trunk Pacific), and is the general headquarters for the entire system. They employ in the city from 2,000 to 3,000 people, who receive in wages from $2,000,000 to $2,500,000 a year, and their repair shops are Moncton's largest industrial establishment. The population in 1911 was 11,345; in 1916 estimated, 15,000.

In addition to the government railways Moncton is served by the Transcontinental, operated by the government, and by the Moncton and Buctouche Railway. It is at the head of navigation on the Petitcodiac River, which is navigable for about nine months of the year for vessels drawing twenty-five feet of water. The water commerce, particularly in coal and molasses, is important. Vessels coming up the river are carried by the "tidal bore," which rises to a height of thirty or thirty-five feet. The tides of the Bay of Fundy, into which the Petitcodiac flows, are famous (see FUNDY, BAY OF).

Moncton is the only city in Eastern Canada to burn natural gas as fuel, and it is the center of one of the three large gas-producing fields in the Dominion. It has a large trade in lumber, agricultural implements, hardware, wholesale groceries and other commodities. Its chief manufactures are woolen goods, flour, biscuits, leather, hats, caps and other articles of clothing, wire fences, aerated waters and woodenware of various kinds.

A conspicuous feature of Moncton is the combined city hall and market, completed in

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The Y. M. C. A. building, the post office, een High School, the Moncton Hospital, d in 1904, and the offices of the govern- ailways are noteworthy structures. H.V.B.

IDAY, *mun'day,* the name of the second f the week, is from the Anglo-Saxon *daeg,* which means *the moon's day.* In t times each of the seven days was dedi- to a god or goddess, and Monday was to the goddess of the moon.

k Monday is the name applied histor- to Easter Monday, April 14, 1360, when oops of King Edward III suffered so bit- rom the cold as they lay before the city is that many men died on their horses. xpression has come to be applied to any Monday, as in the following line from peare's *Merchant of Venice:*

> 1 it was not for nothing that
> nose fell a-bleeding on Black Monday last.

Monday, so called in Bavaria because of lor of the church decorations, is the Mon- efore Lent. In America, the holiday as Labor Day (which see) always falls first Monday in September.

MONESSEN, *mo nes''n,* PA., an industrial city in Westmoreland County, in the south-western part of the state, thirty-nine miles south of Pittsburgh. It is situated on the Monongahela River and is served by the Pitts-burgh & Lake Erie Railroad. Monessen was settled and incorporated in 1898, and the in-crease in population from 11,775 in 1910 to 21,630 (Federal estimate) in 1916 indicates its rapid growth. Only thirty-five per cent of this number are Americans, Slavs, Finns and Italians predominating in the foreign element. The area is about one square mile.

Monessen is noted for its large steel and sheet and tin-plate industries; the former em-ploys over 5,500 people and the latter 1,500. Besides these the city has foundries, machine shops, a woven-wire fence factory and lumber yards; the products of all these are shipped in large quantities. In the vicinity are found de-posits of coal and iron ore. The name Mones-sen associates the Monongahela River with Essen, the Prussian city of steel fame, where are located the great munition works of the Krupps. A.W.B.

ONEY, *mun'i.* If you were to jour- the northwest of Canada, to the farthest Hudson's Bay Company's trading posts, ould find a pocketful of coins or five- bills almost useless. If you asked the eper the price of a certain amount of he would answer, "Two and a half beaver and if you then gave him three beaver e would hand you a small marked stick ur change. Any person in that district take the stick from you in payment for s, but probably nowhere except at the ould you induce anyone to accept the which you had brought with you.

he world's history many different sub- have been utilized for money. At first, se, all exchange was by barter or trade. man was a shepherd and his neighbor a ower, a sheep would be given in return pes or olives. But perhaps the owner of the sheep would not want at one time all the fruit that a whole animal would purchase. So the fruit-grower, since in those days no one knew how to write, would give him a number of pretty stones as *tokens* that he still owed him fruit. Or perhaps he would give him a quantity of grain, salt or some other generally desired commodity of equal value to the fruit still due. Some of the American Indians gave wampum or shells as tokens, and the first white settlers in Virginia traded with both wampum and tobacco.

The gold and silver, nickel, copper and paper money of to-day are not different in principle from those older means of exchange. Gold coins are in a real sense like the beaver-skins and the grain, salt and tobacco currency given in return for objects of equal value. The smaller coins, of silver or other metals, are *token money,* like the Hudson's Bay Company's sticks or the

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pretty stones and wampum. A piece of paper money is a printed token.

The standard metals for the world's money have been chosen for a number of reasons. First, their value is large in proportion to their weight; they can be more easily carried than bags of salt or beaver skins. Secondly, they are not perishable, like tobacco or corn. Then, too, because they are composed of very small grains they can be made into units of exactly equal value and of any size desired. Last of all, their values change but little from year to year, whereas those of most commodities move up and down from season to season. Gold and silver possess these qualities to a greater degree than any of the other metals. Copper, because it is so heavy, is suitable only for the smallest coins.

Cheap Money and Dear Money. Because we think of everything else as being worth a certain amount of money, it seems strange, at first, to hear that money, too, has price and value. Sometimes the expression *price of money* refers to charges for borrowing it, and means in reality the price of capital, which is explained in these volumes in the article INTEREST. But money itself has a price; that is, a silver dollar is worth a certain amount in gold or paper money, and a paper dollar has its worth in silver or gold. So, too, the money of one country has a price in another. In addition, money as a whole has changing value, and when we read that the cost of living is increasing what we really learn is that the value of a dollar is going down, for if a dollar will buy less than formerly it is in a true sense worth less to us.

Gold and Silver Standards. In 1873 the value of the metal in a silver dollar of United States money was exactly a dollar in gold. Then the price of silver began to decrease, so that at times a silver dollar has been worth only forty cents in gold. Other countries have, of course, had similar experiences, and as a result most of them have adopted a *gold standard*. That is, gold coins have been the basis of all money figures, and silver circulates as token money. The United States has had the gold standard since 1900; Great Britain made it legal in 1816. Few countries now maintain a silver standard.

A change in the relative values of gold and silver sometimes creates difficult situations for a government. Thus, the rise in the price of silver in the spring of 1916 brought the value of the metal in a silver rupee of India, which ordinarily circulates as a token coin, to nearly the legal value of the coin. Had silver r very little more, people would have beg melt the rupees to sell the silver in then silver would have been driven out of c tion. This would have been a hardship all the people, because there are no gold of small amount.

At one time the silver half-dollars and ters of the United States were worth an sum in gold, but after the great discove California gold in 1849, these coins were valuable than gold coins and ceased to late, because people saved their silve spent their gold, as explained under the ing GRESHAM'S LAW. For this reason all less than one dollar were made "token" r by putting less metal into them. The a of metal in the minor coins of the U States and Canada is as follows:

UNITED STATES

COIN	GRAINS	FINENESS *	FACE VALUE	VAL PRI MI
Silver				
Dollar	†12.5	.900	$1.00	$
Half-dollar	192.9	.900	.50	
Quarter-dollar	96.45	.900	.25	
Dime	38.58	.900	.10	
Copper				
Five cents	77.6	.750	.05	
One cent	48.	.950	.01	

CANADA

Silver				
Dollar	360.	.925	1.00	
Half-dollar	180.	.925	.50	
Quarter-dollar	90.	.925	.25	
Dime	36.	.925	.10	
Five cents	18.	.925	.05	
Bronze (copper, tin and zinc)				
One cent	87.5		.01	

*Fineness .900 means that only 900 out of 1,000 grains are the metal which gives the c value. The balance of the metal in United silver coins is copper, in the five-cent piece r and in the one-cent piece tin and zinc.

†These values are constantly changing.

Paper Money. Since paper, in itself p cally worthless, becomes money only be of government decree, it follows that its value depends largely on the confidence people have in the promises of the govern The total amount of it which can be iss not controlled, as with gold and silver, b output of mines, but by the quantity whic government determines to print. If too paper money is issued, the currency of a try is said to be *inflated;* like a balloon, no solid backing, and if expanded too f

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ıeme may burst and cause panic. ıper money issued during the Revo- ıe American colonies fell in value

NTINENTAL CURRENCY
paper money of Revolutionary times.

five dollars of it was worth only silver.

two kinds of paper money. The ıes *silver* and *gold certificates,* which are merely receipts for actual metal in the possession of the government, and are issued because convenient to carry. Any person may take these silver and gold certificates to the national Treasury and get metal money for them. Because of this easy and sure exchange people have full confidence in them. But most paper currency is only partly, if at all, secured by reserves of gold or silver. So long as the people think the reserve is large enough to pay any of them who may want to change their paper for metal, the paper money retains its face value, but if the reserve dwindles or disappears, or people lose confidence in the government the value of paper money suffers. Sometimes, in order to prevent the exhaustion of their reserves, countries are obliged to *suspend specie payment.* This happened in the United States after the War of Secession, as told in the article SPECIE PAYMENTS, RESUMPTION OF.

Currency

ɜy which circulates in a country is alled its *currency.* The currency of States and Canada includes, besides oins in the table above, gold coins noney. In both countries the gold n 25.8 grains of metal .900 fine for and the authorized coins are $20, $2.50. In the United States they ouble-eagles, eagles, half-eagles, and cs. Gold dollars were coined prior ıe paper money of the two countries ɜ:

ɜs *Secured By*
lcates,
.....Equal amount of gold.
lcates,
.....Equal amount of silver dollars.
a t e s
up..Gold reserve.
ɜ a n k
up...National bonds.
eserve
.....Gold and commercial paper.

Notes,
.....Gold and bonds.
s, $5,
.....All bank assets.

purchasing power of a dollar de- the relation of the supply of cur- e demand for it, it is necessary, in vent violent changes in the value of establish a currency whose supply ɜ and decrease with the demand—that is, be elastic. In prosperous times, when credit is extended to nearly everyone and checks serve in most business transactions and money circulates rapidly, not so much currency is needed. But when it is feared that there may be a business crisis, when merchants refuse credit to their customers, and people withdraw money from the banks and are afraid to part with what they have, then new currency must be issued. It is to gain elasticity that the Federal Reserve Banks and the banks of Canada are permitted to issue notes partly secured by the promissory notes of bank customers.

The standard moneys of the important countries are given in the following table, with values in United States and Canadian money. The standard is gold in every case, unless another metal is mentioned:

COUNTRIES WITH UNITED STATES AND CANADIAN STANDARD

COUNTRY	STANDARD	VALUE
British Honduras.	U. S. dollar.....	$1.00
Cuba	peso	1.00
Nicaragua	cordoba	1.00
Panama	balboa	1.00
Philippines	peso	.50
Santo Domingo...	U. S. dollar.....	1.00
COUNTRIES WITH BRITISH STANDARD		
Bolivia	peso	$0.973
Colombia	dollar	.973
Ecuador	condor	4.8665
Great Britain....	pound sterling	4.8665
Peru	libra	4.8665

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COUNTRIES WITH STANDARD OF LATIN MONETARY UNION

Belgium	franc	$0.193
Bulgaria	lev	.193
France	franc	.193
Greece	drachma	.193
Italy	lira	.193
Rumania	leu	.193
Serbia	dinar	.193
Spain	peseta	.193
Switzerland	franc	.193
Venezuela	bolivar	.193

COUNTRIES WITH SCANDINAVIAN STANDARD

Denmark	krone	$0.268
Norway	krone	.268
Sweden	krona	.268

COUNTRIES WITH VARIOUS STANDARDS

Argentina	peso	$0.965
Austria-Hungary	krone	.203
Brazil	milreis	.546
Chile	peso	.365
China	customs tael, silver	.705
Costa Rica	colon	.465
Germany	mark	.238
Haiti	gourde, nickel, about	.167
Honduras	peso, silver	.467
India	rupee	.324
Japan	yen	.498
Mexico	dollar or peso	.498
Netherlands	guilder or florin	.402
Paraguay	dollar, paper	a few cents
Persia	kran, silver, about	.080
Portugal	escudo, or milreis	1.080
Russia	ruble	.515
Siam	tical	.378
Turkey	piastre	.044
Uruguay	peso, gold	1.034
Guatemala	peso, paper	a few cents

The value of silver coins in the above table was found by assuming the silver in the United States dollar to be worth 50 cents. C.H.H.

Consult White's *Money and Banking;* Fisher's *The Purchasing Power of Money;* Howard and Johnson's *Money and Banking.*

Related Subjects. The following articles in these volumes will give much additional information on this important subject:

Banks and Banking	Greenbacks
Bimetallism	Gresham's Law
Cent	Guinea
Check	Interest
Coinage	Legal Tender
Coins, Foreign	Livre
Credit, Letter of	Milreis
Crown	Mint
Denarius	Money Order
Dollar	Negotiable Paper
Ducat	Note
Eagle	Penny
Economics	Peseta
Farthing	Peso
Fiat Money	Piaster
Florin	Pine-Tree Shilling
Franc	Ruble
Rupee	Talent
Rural Credits	Thaler
Shekel	Wampum
Shilling	Yen
Sovereign	

MONEY ORDER, sometimes called *postoffice order,* a safe and convenient form for sending any sum of money up to $100, from one place or person to another. Such an order is secured at a department of the United States government postoffice by paying the amount desired to be sent, and a stated commission based upon the size of it. The rates are as follows:

AMOUNT	COMMISSION
Not exceeding $2.50	3 cents
Over $2.50 to $5.00	5 "
" $5 to $10	8 "
" $10 to $20	10 "
" $20 to $30	12 "
" $30 to $40	15 "
" $40 to $50	18 "
" $50 to $60	20 "
" $60 to $75	25 "
" $75 to $100	30 "

If Mr. A. of New York City sends a money order to Mr. B. of Denver, Colo., it is payable at the Denver office; but if Mr. B. happens to be leaving that city when he receives it he may present it, on or before the thirtieth day following the date at which it was issued, at any money-order office in continental United States except Alaska, and will receive payment on it. If, however, he presents it after that date, but within one year from the last day of the month in which it was issued, it can be paid only at the office in Denver, or in New York City, where the money was deposited. But if Mr. B's postoffice order is lost or destroyed before he has cashed it, the receipt given Mr. A by the New York City office may be presented within a year either at the latter place or at Denver, where the order will be cashed, or a *stop order* may be issued, stopping payment of the amount to the finder of the lost money order.

International money orders are payable in almost any part of the world. The commission for sending any sum ranging from one cent to ten dollars is ten cents, and for every extra ten dollars or fraction of that amount an additional ten cents is charged.

Canadian Orders. The costs of Canadian domestic money orders, and of those sent to any of the following countries are given herewith: Antigua, the Bahamas, Barbados, Bermuda, British Guiana, Cayman Islands, Cuba, Dominica, Grenada, Guam, Hawaii, Isle of Pines, Jamaica, Montserrat, Nevis, Newfoundland, Panama Ca-

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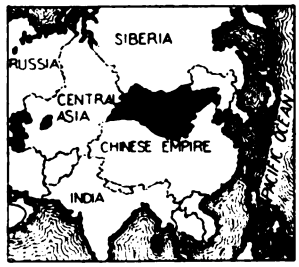
Philippine Islands, Porto Rico, Saint r, Saint Lucia, Saint Vincent, To- idad, Turks Islands, Tutuila, Virgin l the United States:

JNT SENT	COMMISSION
.....	5 cents
ıd up to $30.....	10 "
" " " $50.....	15 "
" " " $60.....	20 "
" " " $100.....	25 "

sending Canadian postoffice orders the British Isles, British possessions ther lands where such may be drawn, e countries mentioned, are, for sums dollars, five cents; over five and up ı cents, the cost for each extra ten fraction of that amount being an ad- ı cents. M.K.

LIA, a vast section of Eastern Asia, to China, bounded on the north by l on the south by the province of which comprises Turkestan, Kulja aria, all Chinese dependencies. It om the Moun- he east bagatai ıe west rs an out 1,- quare rly half United ıe heart gion is



LOCATION MAP

y the Desert of Gobi. The native , wandering Mongols and Kalmucks, iven to agriculture, but roam through with camels, horses and sheep. The is Urga, from which the caravan rried on with China across the Gobi ods being transported by camels to Siberian town lying about 100 miles Baikal.

Iongolia (Khalkha, the Kobdo dis- Trianghai) declared its independence ber 3, 1912, after the outbreak of the evolution, and proclaimed Jebtsun nperor. An agreement was reached on November 5, 1913, between Rus- ina, whereby Russia recognized Outer as part of Chinese territory; China, cognized the autonomy, or self-gov- of Outer Mongolia. In September, a recognized Mongolia's right to con- wn railways and lent coöperation in finding the capital for their construction. Concessions were also granted to build telegraph lines from the Irkutsk district in Southern Siberia to the Mongolian line at Uliasutai. Since March, 1915, Mongolia has had its own legal currency. Population, about 2,600,000.

Consult Kendall's *A Wayfarer in China.*

MONGOLIAN, *mong go' li an,* **RACE,** or **YELLOW RACE.** See RACES OF MEN.

MONGOLS, *mong' golz,* a wandering, warlike tribe of people, a branch of the Tartar race, whose original home was the plains of Central and Eastern Asia. Early in the thirteenth century countless hordes, led by their first great chieftain, Genghis Khan, began a devastating march through Northern China, Turkestan and Persia, slaughtering, burning and pillaging with inhuman cruelty (see GENGHIS KHAN). In the reign of Oktai (died 1241), son and successor of Genghis Khan, the invaders pressed into Europe and devastated a large part of Russia, Poland and Hungary. Just when the civilization of Western Europe seemed doomed to be destroyed, Oktai died and the merciless warriors were called home.

Kublai Khan (1214-1294), one of the most famous successors of Oktai, set up his royal court in China at Cambalu, the modern Peking. There the celebrated traveler Marco Polo (see POLO, MARCO) lived for many years. When Kublai Khan died his empire was separated into several weak kingdoms. These were reunited by the great Timur, or Tamerlane (1336-1405), a powerful monarch who extended his dominions over nearly all Asia and ruled as the lord of the earth from his capital city, Samarkand. See TIMUR.

The great empire of Timur fell to pieces after his death, but a powerful Mongol state, known as the Kingdom of the Great Moguls, was established in India in 1525, by Baber, one of his descendants. Magnificent courts were maintained at Delhi and Agra, and a Mogul emperor, Shah Jehan (1628-1658), erected at the latter city, as a mausoleum for his favorite wife, one of the most beautiful buildings in the world (see TAJ MAHAL). The Mogul kingdom in India lasted until the eighteenth century, when it was destroyed by the English. The inhabitants of Mongolia (see above), a colonial possession of China, are descendants of the ancient tribe.

MONGOOSE, *mong' goos,* or **MUNGOOSE,** a small weasel-like animal of a yellowish-gray color and long, stiff hair, notable for its skill

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mice, rats and snakes. It is about
long and has a fierce disposition,
tamed. It seizes and kills snakes,
us cobra included, and avoids the
e serpent by its agility. In parts of
it has been colonized to destroy ver-
t increases in numbers so rapidly that
ultry and small animals have suffered
For the latter reason, since 1902 the
of a live mongoose into the United
has been prohibited by law.

TOR, *mon' i ter*, the name of a species
ge lizards, sometimes wrongly called the
a by Europeans. They are the largest liz-
of the Eastern hemisphere, and live in the
rs of Egypt, India and Africa, where they
greatly feared by the natives. These crea-
res often attain a length of six feet and are
reenish-gray or brown on the back, with fine
ellow lines and black stripes on the head and
neck. Young crocodiles or crocodile and turtle
eggs form the principal food of the monitor,
while the big crocodile is its greatest enemy.
The natives believe that these lizards warn their
fellows with a hiss and plunge down into the
water when a crocodile approaches; the name
monitor, or *warning lizard*, is derived from this
habit. See LIZARD.

MONITOR AND MERRIMAC, *mer' i mak*,
the names of two ironclad warships that en-
gaged in a naval encounter in Hampton Roads,
Va., on March 9, 1862, during the War of Seces-
sion. The *Monitor* was the invention of Cap-

THE HISTORIC SCENE
Engagement of the first iron-clad ships of war, in Hampton Roads.

tain John Ericsson, and was the first successful
ironclad vessel in the United States navy, be-
ing constructed at Greenpoint, L. I., between
October, 1861, and January, 1862.

The length of the *Monitor* was 172 feet; it
lay so low in the water that its flat iron-plated
deck was but two or three feet above water level.
The revolving turret contained two eleven-inch
guns and was made of iron so thick that it could
stop a heavy cannon ball. The *Monitor* was
on January 30, 1862, and sailed on
ton Roads to meet the *Mer-*
ship which had
in the
harbor and had been rechris
The two vessels met on March 9, and a
four hours' battle the Monitor forced her oppo-
nent to retreat to Norfolk in a disabled condi-
tion; the broadsides fired by the *Merrimac* pro-
duced no effect on the "cheesebox on a raft,"
as the *Monitor* had been ironically nicknamed.

This naval engagement demonstrated the
value of armored vessels; it put an end to the
building of wooden ships of war, and these
comparatively simple vessels proved the fore-
runners of the 25,000-ton steel battleships of
the present day. See ERICSSON, JOHN.

MONK, *mungk*, originally a man who aban-
doned the world and retired to solitary life for
religious reasons. At the present time the term
is applied to any member of a community of
people, men or women, who have retired from
the world because of religious vows which they
have taken. It is probable that the first order
of Christian monks originated in Northern
Egypt in the third or fourth century. The
members lived solitary lives, devoting them-
selves to the study of the Scriptures, medita-
tion and prayer. Later monks began to gather
themselves into communities and to erect
monasteries. There are now many monastic or-
ders, especially in the Roman Catholic Church,
and their members are found in all lands. See
MONASTICISM.

MONK, or **MONCK,** *mungk*, GEORGE, first
Duke of Albemarle (1608-1670), an English col-
dier famed for his share in the restoration of
the Stuarts to the throne of England after the
execution of Charles I. Throughout his entire
military career, which was begun to escape the
consequences of a thrashing given by himself
to an officer who had wronged his father, he was
distinguished for his ability to fill difficult
places, for his keen judgment and for his fear-
less energy. As a soldier he served in Spain,
Holland, Ireland, Scotland and England. Dur-
ing the struggle between Parliament and Charles
I, Monk held a command under Cromwell in
Scotland, and remained there to complete the
union of Scotland with England. After the
death of Cromwell, he secretly waited for the
right time to advance to London and restore
crown to the Stuart king, Charles II. This
eventually did without shedding blood, by
ing together the Presbyterian members who
been expelled from Parliament in 164
securing a majority favorable to the
tion. In recognition of this service C
created him Duke of Albemarle. See
WEALTH OF ENGLAND.

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KEY, *mung'ki,* the name of a group of that possess special interest for young l because of their very remote resem- to human beings in appearance and in their actions. The monkey cage at the circus is a of interest, erybody watch the faced lit- tures, eat- nuts, clean- h other or mischiev- anks, and ime seem- be deep in ht. The s supposed rived from lian word g *old woman,* and refers, apparently, to emblance of a monkey's face to that of led old lady. Though the name is ap- popular language to a wide variety of animals, strictly speaking monkeys te the group with long tails and short, faces. The larger, tailless members of ily are called *apes;* to this division be- e gorillas, chimpanzees, orangutans and .

COMMON MONKEY
The monkey pictured above in the act of catching a fly is of the species that children commonly see in zoölogical gardens and in menageries.

eys at Home. Monkeys in their homes ropical forests are even more interesting the zoo. They live in pairs, as do men men, and their love for their families is than that of many human beings. They n groups, and when they reach a stream t would be difficult for the mothers and to cross, the fathers form themselves chain, swing from the limb of a large d make a living bridge to another tree opposite bank. This feat is easy for and Central American monkeys, which ng, strong tails, almost as useful as a nd. All monkeys have in effect four for their toes are thumbs and fingers. rms are often longer than their legs. al food of monkeys is fruit and insects, netimes includes eggs, young birds and . They are very cleanly animals, and thers are said to bathe their children in er every day, when possible.

monkeys do not thrive in captivity, and ery sensitive to cold. It has been found the summer they endure captivity bet- en placed in outdoor cages than in en- closed ones. They are as a rule easily tamed, never, even in the jungle, fighting a man unless in self-defense. The Old World monkeys are especially clever, but almost any monkey is quick to learn simple tricks such as an organ-grinder teaches his pet. In India they are considered sacred, and are never interfered with in the mischievous pranks they like to play, even when these cause great annoyance.

Monkeys as Pets. Some very interesting facts are recorded by those who have had opportunity to study the ways of pet monkeys. They respond readily to kind treatment and show their affection by caresses and kisses. Monkeys try to talk to their owners both by gestures and by sounds, and they seem to be able to communicate with one another with ease. One investigator who spent many years in studying pet monkeys recorded the speech of several of his little captives by means of a phonograph. He found that in some cases there were slight inflections in the sounds used. Usually monkeys of one species do not try to acquire the speech of those of a different species, but there are exceptions to this rule. They vary their talk according to their emotions, sometimes screaming with anger or alarm, and again uttering low, plaintive sounds which may mean affection, sorrow or repentance. The funny chattering of the monkeys in the zoo is of course familiar to everyone. Whenever these little creatures find a home in the household they should be given toys, for monkeys are generally happy if they have something to play with and plenty to eat.

Varieties. American monkeys, most of which live in Brazil, Guiana, Venezuela, Central America and Mexico, are easily distinguished from those of Africa and Asia by the greater breadth of their noses. They also have two more teeth in each jaw. The best-known species is the *capuchin,* light-colored on the top of the head, named from the French word for *hood;* it is also called the *sapajou.* There are also the *howler,* whose name is taken from its peculiar cry and is well deserved, and the *spider monkeys,* long and slender, whose tails are stronger than those of any other species. The monkeys in the Eastern hemisphere are more varied in color than the American, some having touches of brilliant red, blue and yellow, in addition to the usual green, gray or brown. Perhaps the strangest looking of all monkeys is the *proboscis,* or trunk, monkey of Borneo, whose nose is a miniature of an elephant's trunk. M.S.

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Consult Garner's *Apes and Monkeys, Their Life and Language;* Elliot's *A Review of the Primates.*

Related Subjects. The reader is referred to the following articles in these volumes:

Ape	Loris
Aye-aye	Marmoset
Howlers	Sapajou
Lemur	

MONMOUTH, *mon'muth,* BATTLE OF, an important battle fought at Monmouth, N. J., on June 28, 1778, during one of the darkest hours of the Revolutionary War. The American army, commanded by Washington, had suffered during the preceding winter at Valley Forge, while the British army was in command of Sir Henry Clinton. On June 18, 1778, Clinton's army left Philadelphia and retreated across New Jersey, while Washington with 8,000 men followed in the rear, in order to attack the left wing of the enemy. General Charles Lee, with a force of 6,000 troops, was detailed by Washington to assail Clinton until his arrival. Lee ordered an attack, but the assault was so mismanaged that his army was thrown into confusion and a retreat was begun. When Washington arrived he personally took command, rallied the forces and renewed the attack. After the day's battle was over Clinton withdrew his army under cover of night to the heights of Middletown. Though the battle was indecisive, the practical advantage lay with the colonial forces. The American loss was 362 wounded and killed, and the British loss 416. This battle ended the war in the middle colonies.

MONMOUTH, JAMES, Duke of (1649-1685), a pretender to the throne of England, who, to attain his ambition, headed an insurrection which bears his name. He was the natural son of Charles II and was educated in France. On the restoration of the Stuarts, after the death of Richard Cromwell, his father recalled him to England and created him Duke of Monmouth. In 1663 he married Anne, daughter of the Earl of Buccleuch, and assumed his wife's name of Scott. He became known as the Protestant duke, and the Protestants aimed to place him on the throne instead of the legal heir, James, Duke of York, but they were unsuccessful.

After the discovery of the Rye House Plot (which see), in 1663, he fled to Holland, but when the Duke of York ascended to the throne as James II, he gathered a force in the Netherlands and resolved to invade England and demand the crown. He landed at Lyme, in 1685, and issued a proclamation declaring James to be a usurper, tyrant and murderer. Utterly routed at the Battle of Sedgemoor, Monmouth was taken into the presence of his uncle, the king, whom he begged piteously but in vain to spare his life. James ordered him sent to the Tower, and on July 15, 1685, at the age of thirty-six, he was executed. After his death there were no further attempts at insurrection, and his followers paid a fearful price for their loyalty to him in the punishment meted out by the cruel Judge Jeffreys (see JEFFREYS, GEORGE).

MONMOUTH, ILL., the county seat of Warren County and a manufacturing city, situated in the northwestern part of the state. Galesburg is sixteen miles northeast, Burlington is forty-eight miles southwest and Chicago is 179 miles northeast. Transportation is provided by the Chicago, Burlington & Quincy and Minneapolis & Saint Louis railways, and connection is made with the Santa Fe Route by interurban electric lines. Monmouth was settled in 1836 and was incorporated in 1852. Locally it is known as the "Maple City." The population increased from 9,128 in 1910 to 10,177 in 1916 (Federal estimate). The area is two and one-quarter square miles.

The country surrounding Monmouth is a good farming region, and there is also coal-mining. Pottery and stoneware rank first in the list of manufactures, one establishment being among the largest of its kind in the United States. Agricultural implements, sewer pipe, drain tile, cotton mittens and cigars are prominent among the other products of the city. A $150,000 Federal building, a courthouse, Monmouth Hospital and a $150,000 high school are buildings worthy of note. Besides its public schools, the city has the Warren County Library, containing nearly 40,000 volumes, a business college and Monmouth College (United Presbyterian), established in 1856. J.H.M.L.

MONOCOTYLEDON, *mon o kot i le'dun.* See COTYLEDON.

MONOMANIA, *mon o ma'ni a,* a term derived from the Greek words *monos,* meaning *single,* and *mania,* meaning *madness,* is applied to a form of insanity in which the mind of the patient is deranged on a single subject, or on one idea. It is sometimes called insanity, and often takes the form of belief in annoyance or persecution. The physical condition of the patient is generally normal, and those suffering from a mild form of monomania usually obtain help in a properly-conducted hospital for the insane. One who has become obsessed by a subject so that he can talk about little else, and

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who holds extreme views in regard to it, is derisively spoken of as a "monomaniac." See INSANITY.

MONOMETALLISM, *mo no met' al iz'm.* See BIMETALLISM.

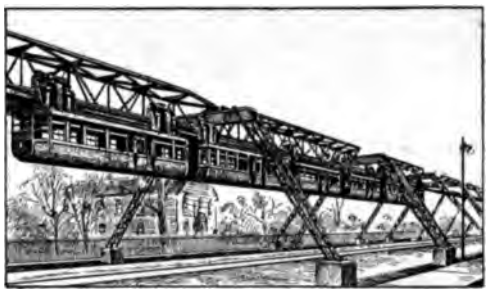
MONONGAHELA, *mo non ga he' la,* **RIVER,** the larger of two streams which unite to form the Ohio River, the other being the Allegheny (which see). The Monongahela is formed by the confluence of the Tygart and West Fork rivers, in Marion County, Va. It flows northeast in an irregular course across the boundary of Pennsylvania to the mouth of the Cheat River, and then north until it unites with the Allegheny at Pittsburgh. The Cheat and the Youghiogheny are its chief branches, the latter entering it at McKeesport, and it drains an area of over 7,300 square miles. Its length is about 150 miles, excluding its branches, and by means of a series of locks and dams it has been made navigable from Fairmont in West Virginia to its junction with the Allegheny. It traverses a fertile country in which bituminous coal is found. The first glass factory west of the Alleghany Mountains was built at New Geneva, on the Monongahela. Near its junction with the Allegheny River the army of Braddock was defeated in 1755 in the French and Indian War (see FORT DUQUESNE).

MONOPOLY, *mo nop' o li,* the exclusive right to deal in some commodity or to trade in a certain market. During the seventeenth and eighteenth centuries it was common for European sovereigns to grant such coveted privileges to persons or corporations, and the greatest variety of operations were conducted in this way. Such special privileges are now generally regarded as contrary to the general welfare of a community or state. They worked a great hardship on the people of the early modern period, because prices were not regulated by open competition but were fixed according to the will of the owner. The greatest of the English monopolies was that enjoyed by the powerful East India Company, which had the exclusive right, by government grant, to trade privileges in India. See EAST INDIA COMPANY.

At the present time monopolies of the kind mentioned are not encouraged by enlightened governments, but monopolies of another sort have survived. The great trusts of America came into being as the result of the efforts of a group of men to control markets and to regulate the prices of the commodities in which they dealt (see TRUSTS). Monopolies are also created by buying up the available supply of any commodity, such as valuable ore lands, oil wells, etc., and it was to prevent such misuse of natural resources that the conservation movement had its origin (see CONSERVATION). It is becoming an established principle that industries which are recognized as monopolies must be subjected to public control, so the owners may reap only reasonable profits. Certain kinds of public service may be rendered most satisfactorily by monopolies created by franchise, such as telephone and street-railway service in cities. These are called *natural* monopolies. The modern tendency is either to subject them to rigid regulation or to operate them as public properties. See MUNICIPAL OWNERSHIP.

Consult Levy's *Monopoly and Competition;* Ely's *Monopolies and Trusts.*

MONORAIL, *mon' o rayl,* SUSPENDED. In 1901 a German engineer, Eugene Langen, completed an electric railway a little over eight miles long connecting the towns of Eberfeld and Barmen, near Cologne, and introduced a



MONORAIL CONSTRUCTION

new method of construction. He suspended a single rail—hence the name monorail—by means of trusses from curved arches; he put the trucks on the top of the car, one at each end, each of two wheels placed tandem, that is, one after the other. These flanged wheels ran on the suspended rail. The truss work supporting the rail is on one side of it, for the other side must be clear to allow the fastenings supporting the car to reach up to the trucks. It appears at first glance to be a dangerous device, but the center of gravity of the car is under the supported rail. The cars used on this German road are thirty-eight feet long, eight feet wide and seven feet high; they weigh twelve tons. At stations where passengers enter and leave the car, the latter is supported by guard rails, to prevent its swaying.

The advantages of the monorail are cheaper construction and operation, safety, greater speed and much less noise. The line admits of sharp curves, for the car having a pendulum

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motion swings out as it rounds curves and comes to its usual position with no jar. The German line is an elevated one running above the streets and part of the way swings out over a river, but the same principles could be applied to the ordinary surface car, hanging only a foot or so from the ground.

In the United States a Massachusetts company began experimenting with a like device in 1914, attempting to improve upon the original German model.

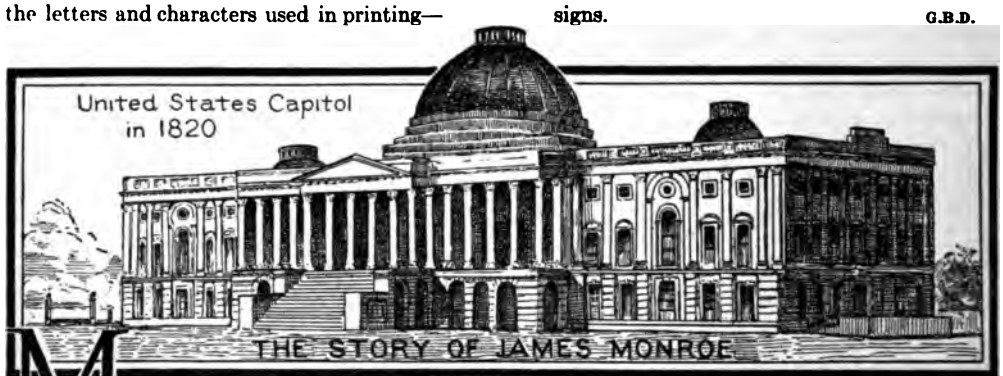
MONOTYPE, *mon' o tipe,* a delicate and intricate machine which casts and sets type, one letter at a time, as a compositor would take them from his case and arrange them into words. It is one of the two chief kinds of type-casting and setting devices, the other being the linotype, which differs from the monotype in that it casts and sets type in a solid bar of metal the length of a line of print (see LINOTYPE).

The monotype is used in setting the type for fine books and in any kind of publishing where a more leisurely process is possible than that followed in the great metropolitan newspaper offices. When the news is received "hot and hot," as the saying is, and edition follows edition with bewildering rapidity, it is necessary to use such a machine as the linotype, which produces printing type in response to a single pressure of the operator's finger. The monotype does not do this. It is made in two parts, and two distinct processes are required to produce the type.

One part of the monotype is a machine looking somewhat like an ordinary typewriter, but having a much larger keyboard, containing all the letters and characters used in printing—257 in all. By pressing the keys, the operator releases tiny metal punches, which make perforations in a paper ribbon. At the end of each word a spacing key is struck, and when the line is nearly filled out, a bell warns the operator that he will have to begin a new line. The keyboard of the monotype turns out, not type, but only a paper ribbon with perforations.

The second part of the machine is much more complicated in structure, and to the inexperienced eye the things that can be done with it suggest a kind of magic. The ribbon, with its many tiny holes, is fed into the casting machine backwards. It passes over a board having on its surface many small perforations exactly corresponding to all that may be punched in the ribbon. When any perforation or series of perforations passes over similar holes in the board, a jet of compressed air operates a little piece of mechanism, which, as deftly as any human printer, picks up the proper matrix—the mold from which letters are cast—and carries it to the casting box, where it forms the letter in melted type-metal. The newly-made letter is carried to a galley; letters become words, words extend into lines, and when a line is finished the machine properly spaces it.

One of the advantages of the monotype is that if errors are made in a line or word, they can be corrected just as in hand-composition, since all the letters and spaces are separate. In the case of the linotype, on the contrary, the solid line containing a fault has to be recast. When operated by a skilled workman the monotype is capable of doing high-class work representing a wide range of type, including large advertising type and borders in varying designs. G.B.D.



MONROE, *mun ro',* JAMES (1758-1831), an American statesman, fifth President of the United States. Monroe's election to the Presidency was the climax of a long public career in the course of which he held almost every possible public office. Beginning as a member of the Virginia assembly, he was in turn a member of the Congress of the Confederation,

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again a member of the assembly, a United States Senator, governor of Virginia, minister to France, Great Britain and Spain, Secretary of State and finally President. As President he was responsible for the announcement of the policy which is now known as the Monroe Doctrine (which see), a principle which for nearly a century remained the basis of the foreign policy of the United States. Monroe was President during the "era of good feeling" which followed the War of 1812. The credit for the prosperity which accompanied his administration does not belong to him alone, but there is no doubt that he deserves much of it. Monroe's administration is noteworthy for the permanent stamp of independence it left on the nation. Washington and the heroes who fought at Bunker Hill, Brandywine and Yorktown had succeeded in establishing an uncertain independence for the United States—how uncertain the first ten years of the nineteenth century showed clearly. Monroe made that independence permanent, and transformed the United States into a self-respecting, mature nation. As a man he may sometimes have been untactful. As a public servant he was faithful to his country and his party, and as a statesman he was devoted, throughout his life, to his ideal of a greater and better nation.

His Youth. James Monroe was born in Westmoreland County, Virginia, on April 28, 1758. His family was of Scotch origin, although for many generations resident in Virginia. At the age of sixteen he entered the College of William and Mary, at that time without question the most flourishing institution of its kind in the South, if not in the whole country. College studies, however, were cut short by the Revolutionary War. With some thirty fellow-students and three professors Monroe joined the young men who were hurrying to Washington's headquarters from every section.

His Brief Military Career. Monroe was given a commission as lieutenant in the Third Virginia Regiment, which was stationed near New York City. He took part in the battles of Harlem Heights, White Plains and Trenton, being wounded during the last. In campaigns of the next two years he was a volunteer aide on Lord Sterling's staff, and with the rank of major fought at Brandywine, Germantown and Monmouth. As a soldier Monroe was not a success for reasons which are still uncertain. His conduct was above reproach, and he had been mentioned with favor and praise by General Washington, yet he won no substantial promotion. In 1778 he was given the rank of lieutenant-colonel and was sent to Virginia to raise a new regiment. This was not an important task, but it had an unexpectedly great influence on Monroe's career. It gave him a chance to make the acquaintance of Thomas Jefferson, who was then governor of Virginia, and out of this acquaintance grew an intimacy which had a share in directing Monroe's later career at almost every turn.

Monroe as a Legislator. After 1778 Monroe's military services were negligible. In 1782, however, he began his long career as a public servant by winning a seat in the Virginia assembly. In the next year he was transferred to the Continental Congress, in which he was a delegate for three years (fourth, fifth and six Congresses). During this period he was particularly active in the discussion of the territorial and boundary disputes which followed the end of the Revolutionary War. He favored the development of the West, and merely to inform himself of conditions there, made two trips west of the Alleghanies. It is interesting, however, that he was continually fearful lest the United States become a monarchy, and he fought every move to strengthen the national government. Thus he was naturally an Anti-Federalist first, and later a Democratic-Republican. See POLITICAL PARTIES IN THE UNITED STATES.

JAMES MONROE

He will always be remembered for his state paper, in the form of a message to Congress, in which the "Monroe Doctrine" was announced to the world.

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At the end of his third term in the Continental Congress Monroe determined to retire from public life and settle down to practice law. This he was not permitted to do. Instead he was promptly elected again to the Virginia assembly, in which he sat for four years. In 1788, in the convention called to consider the Federal Constitution, Monroe allied himself with Patrick Henry in opposition, and tried in vain to prevent ratification. In 1790 the assembly elected him to fill a vacancy in the United States Senate, in which he generally sided with the Anti-Federalists and earnestly opposed the policies of the Washington administration.

As a Diplomat. The second period of Monroe's public career is the diplomatic phase. During his term in the Senate Monroe was an outspoken opponent of Washington's policies, but the President nevertheless appointed him in 1794 to succeed Gouverneur Morris as minister to France. At the same time John Jay, the Federalist, was sent to England. Thus Washington wisely distributed the balance between the two political parties. Monroe did not perform his duties to the entire satisfaction of the President. He reached Paris just after the fall of Robespierre, and was officially received by the Convention on August 15, 1794. Apparently overcome for the moment by his enthusiasm, he addressed the Convention in words none too tactful. Among other remarks calculated to arouse resentment in England, Monroe said that the Jay Treaty was "the most shameful transaction I have ever known of the kind." Although Monroe spoke thus openly, he seems to have done nothing to convince France that the Jay Treaty was not provocation for war against the United States. Relations between the United States on the one hand and France and Great Britain on the other were already strained, so that Washington finally recalled Monroe in 1796. Monroe's recall caused extreme party feeling for a brief time, and Monroe himself felt called on to publish an elaborate defense of his conduct and then retired to private life. Washington, it is known, never forgave Monroe for the latter's pamphlet, *View of the Conduct of the Executive*.

This retirement lasted only three years, for in 1799 he was elected governor of Virginia, a position he held until 1802. In the meantime Thomas Jefferson, Monroe's intimate friend, had become President, and in 1802 sent Monroe to France as a commissioner to assist Robert R. Livingston in negotiating for the purchase of the mouth of the Mississippi. The commissioners bought not only the land at the mouth of the Mississippi, but the entire Louisiana Territory (see LOUISIANA PURCHASE). Next Monroe served as minister to Great Britain and then as minister to Spain. The treaty which he finally negotiated with Great Britain was unsatisfactory to the President, because it did not include the abandonment of the British claim to a right to impress seamen. It was never offered to the Senate for approval. At Madrid Monroe tried in vain to arrange the transfer of Florida to the United States. Thus Monroe as a diplomat was not successful, if success means reaching the goal for which one starts. On the other hand, it is generally recognized that he faced tremendous handicaps and did the best he could.

As an Executive. On his return to the United States in 1807 Monroe felt it necessary, just as he had in 1796, to make public defense of his actions in Europe. The leaders of the nation were divided in their opinions, but the public was enthusiastic in its approval. He was again elected to the Virginia assembly, and in 1811 was again elected governor of Virginia. Before the end of the year, however, he resigned the governorship to become Secretary of State under President Madison. This office he held until his own elevation to the Presidency in 1817, and in 1814 and 1815 also acted temporarily as Secretary of War. During the War of 1812, therefore, he bore a double burden in a trying situation, but he performed invaluable service to the country and added greatly to his favor with the public. He was especially active in attempting to protect Washington, the capital, from an enemy attack. In 1816, while still Secretary of State, he was elected President of the United States, receiving 183 electoral votes to 34 for Rufus King, the Federalist candidate.

The Administrations of James Monroe, 1817-1825

Era of Good Feeling. The eight years of Monroe's Presidency are generally known as the "era of good feeling." The War of 1812 resulted in a stronger sense of nationality and confidence throughout the country than there had ever been before. From that time on the United States had less the character of a temporary experiment. The country had also won respect abroad, and was recognized in the family of nations as it had not been before. From

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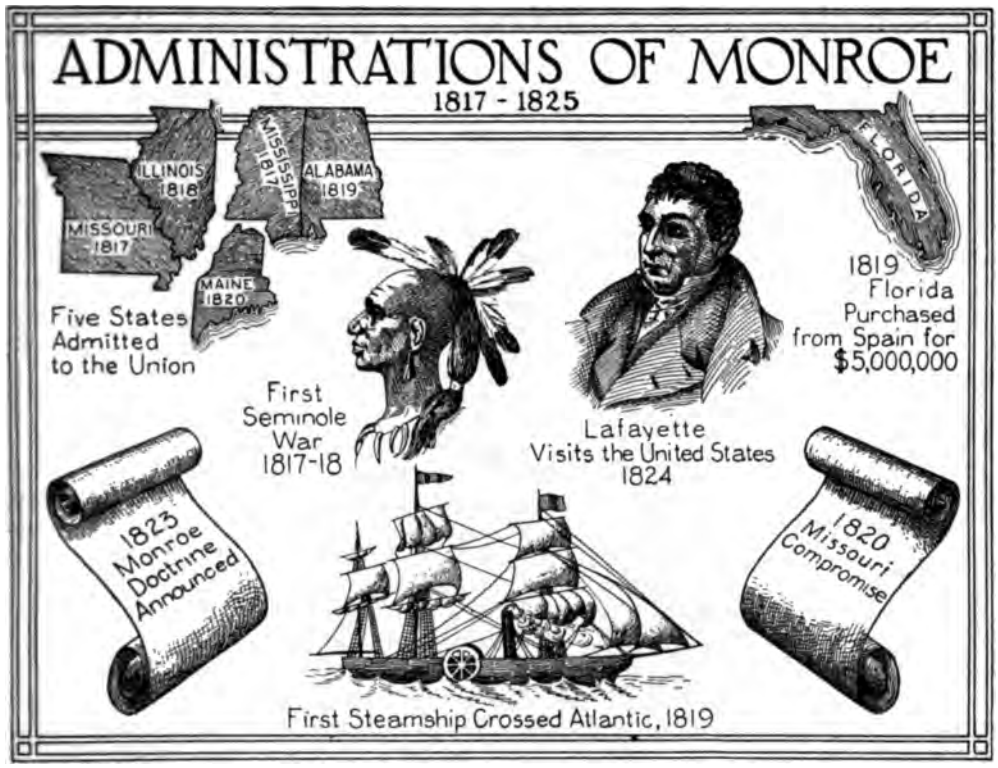

1789 to 1815 the European nations were absorbed in politics and war, and at the end of that time they turned to the West to find that a new nation had begun to grow in America. On land, to be sure, the Americans had suffered several severe defeats, but they had proved that on the sea they could sail and fight ships of war on an equal basis with the English. This fact alone helped to give Europe a new respect for the United States. In domestic affairs the United States was to reap the advantage of broken party lines. The Federalist party, largely because of its unpatriotic stand during the War of 1812, had lost almost all influence. There were really no political parties during Monroe's administration. There were sharp differences of opinion on many great problems, but there were no hard, set lines of division. There were, too, many smaller contests between men whose personal ambitions conflicted. These created as much bitterness in this "era of good feeling" as the differences of opinion on important public policies. An excellent example is Henry Clay's bitterness against Monroe after the latter had passed him by and made John Quincy Adams Secretary of State.

Westward Expansion. One of the first questions on which Clay and Monroe became opponents involved "internal improvements." In the closing months of the preceding administration Congress had voted a fund for such improvements, which Madison vetoed. Monroe, in his characteristically conscientious fashion, made an extended tour of the Northern and Western states two months after his inauguration. Instead of converting him, the trip seems to have removed none of his objections. In his first message to Congress he declared it to be his "settled conviction" that Congress did not possess the right of constructing roads and canals. The challenge thus offered was accepted by Clay, who maintained that the Constitution did give the Federal government the power to construct roads and canals, and even asserted that the consent of the states, which had been thought necessary before beginning the construction of the Cumberland Pike, was not required at all. He spoke, he said, as a Western man, as a representative of a new country and a pioneer population, needing means of communication, channels of commerce and intelligence as the breath of life. He spoke as a citizen of the Union, looking forward to a great

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destiny. Was the Constitution made for the benefit of the Atlantic margin of the country only—for the few millions then inhabiting this country? "No," he exclaimed, "every man who looks at the Constitution in the spirit to entitle him to the character of a statesman, must elevate his views to the height which this nation is destined to reach in the rank of nations. We are not legislating for this moment only, or for the present generation, or for the present populated limits of the United States; but our acts must embrace a wider scope—reaching northwestward to the Pacific, and southwardly to the River Del Norte. Imagine this extent of territory covered with sixty, seventy, or an hundred millions of people!"

This was the vision of Henry Clay, and to a lesser degree became the vision of nearly every man and woman in the United States. During Monroe's Presidency it was still regarded by many as a dream, but Clay held to it. Five states were admitted to the Union—Mississippi in 1817, Illinois in 1818, Alabama in 1819, Maine in 1820, and Missouri in 1821—and Florida was purchased in 1819. These were visible signs of national expansion, and it was only a few years before the nation was convinced of the need for internal improvements.

War with the Seminoles and the Florida Purchase. During the War of 1812 United States troops had taken possession of West Florida, but East Florida remained in the hands of the Spaniards. The latter made no attempt to preserve order, and the territory was overrun with white adventurers, escaped negro slaves and Seminole Indians, the latter being a tribe of hostile Creeks. Not infrequently bands of Indians and negroes crossed the Georgia frontier on marauding expeditions, and then fled back into Spanish territory. The Georgians lived in constant danger and were also annoyed that their runaway slaves had such an easy refuge. At the end of the year 1817 war broke out between the whites and the Seminoles in Georgia. General Andrew Jackson was ordered to take command of the United States forces. Jackson advanced through Georgia with great haste, and by March, 1818, was on the Florida frontier.

Jackson's theory was that he was to follow the Indians until he caught them, wherever they might go. He therefore pursued the Indians into Florida, and after defeating them, turned and captured Pensacola, whose Spanish governor had been supplying the Indians with arms. In five months Jackson broke the power of the Indians, established peace on the border, and for all practical purposes had conquered Florida. In itself the campaign was insignificant. Jackson's army included 3,300 men of whom 1,500 were friendly Indians; not one white man was killed, and the Indians lost only twenty men. Yet in its results the Seminole War was one of the most important in American history. It nearly caused a war with Spain and with Great Britain, two of whose subjects Jackson had summarily and unjustly condemned to death. It did actually result in the negotiation, in 1819, of a treaty for the sale of Florida by Spain to the United States for the sum of $5,000,000. The treaty was formally ratified in 1821, and in March, 1822, Florida was organized as a territory of the United States.

The Missouri Compromise. Early in 1818 Missouri, which had been a territory since 1812, applied for statehood. The House of Representatives agreed to the admission of Missouri on condition that slavery be prohibited. This provision was defeated in the Senate, and thus for the first time brought slavery prominently before the public as a national political issue. The slave and the free states were henceforth anxious to maintain the balance between the two sections. Whenever a territory applied for admission as a state, it was always necessary to consider the question of balance between those states in which slavery was permitted and those in which it was forbidden. Largely through the efforts of Henry Clay an arrangement known as the Missouri Compromise (which see) was agreed on in 1820. President Monroe approved the bill for the admission of Maine on March 3, 1820, and for Missouri three days later, but the admission of Missouri was delayed for a year, until the Missouri legislature agreed not to exclude free negroes from the state.

The Monroe Doctrine. In his annual message to Congress in 1822, President Monroe recommended the recognition of the independence of the South American republics. Congress promptly responded. In December, 1823, Monroe made certain references to American foreign policy; these form the basis of the famous Monroe Doctrine. This historic document is discussed at length under its title.

The American System. In spite of President Monroe's opposition the vogue of internal improvements steadily increased. In fact, internal improvements became a part of what Henry Clay named the "American system." In 1821 the Republicans in Congress defeated a bill providing for the beginning of a national

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OUTLINE AND QUESTIONS ON JAMES MONROE

Outline

I. Youth and Preparation

(1) Birth
(2) Ancestry
(3) Education

II. Military Experience

(1) First campaign
(2) On Lord Sterling's staff
(3) In Virginia

III. Public Career

(1) In Virginia assembly
(2) In Congress
(3) In Virginia convention of 1788
(4) As United States Senator
(5) Minister to France
(6) Governor of Virginia
(7) Further diplomatic missions
(8) Again governor of Virginia
(9) Secretary of State

IV. His Administrations

(1) "Era of good feeling"
  (a) Its causes
  (b) Its effects
(2) National expansion
  (a) Internal improvements
  (b) Five new states
(3) War with Seminole Indians
  (a) Causes
  (b) Significance
  (c) Purchase of Florida, 1819
(4) Crisis of 1819
(5) Missouri Compromise
  (a) Necessity for compromise
  (b) Details of arrangement
(6) Election of 1820
(7) Monroe Doctrine
(8) The "American System"
  (a) To build home markets
  (b) To strengthen home industries
(9) Lafayette's visit to America
(10) First steamer crossed Atlantic

Questions

Which of the following men belonged to Monroe's party: Madison, Jefferson, Jay, Washington, Marshall, John Randolph, Patrick Henry?

In what battles of the Revolutionary War did Monroe take part?

What was his part in the War of 1812?

Why was Monroe's expedition into Virginia in 1778 of importance?

How did Washington "maintain the balance" when he sent Monroe as minister to France?

What did Monroe call "the most shameful transaction I have ever known of the kind?"

In what sense was he not successful as a diplomat?

What was the "vision of Henry Clay?" How far has it become an actuality since his day?

How did it happen that there were no political parties during this administration?

How was the great popularity of the President shown in the election of 1820?

What is the combined area of the states admitted during this administration?

In what sense can it be said that a war in which not a white man was killed was one of the most important in the history of the country?

Of what document was the statement that America is not to be considered a "subject for future colonization by an European power" a part? What are the essential features of the declaration?

What part did Monroe assume in the affairs of his country before his election to the Presidency?

In what year did the first steamship cross the Atlantic Ocean?

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canal system, but in the next year only the President's veto prevented the appropriation of funds for the Cumberland Road. In 1824 the supporters of the American system were in the majority in both Houses, and Monroe finally signed a bill providing for surveys of national canals. The other essential of Clay's system was a protective tariff, the argument being that protection was necessary to build up home industries and to provide a home market for their products. Politics played some part in the passage of a protective tariff act in 1824, but party lines, so far as any existed, were disregarded. It was the year of a Presidential election, but the four leading candidates—Clay, Adams, Crawford and Jackson—were all open advocates of protection. The tariff of 1824 was approved by the Central and Western states, for it increased the duties on iron, lead, wool and other articles for which they desired protection. But it was strongly opposed by the South and by all the New England states except Rhode Island and Connecticut.

It is worthy of note that the demand for protection was preceded, then as many times since, by a financial crisis and industrial depression. During the War of 1812 business was stimulated and prices were high. The tariff of 1816 was passed to ward off the flood of cheap English goods which began to pour in as soon as peace was declared, but it failed to achieve its object. The expenditures of the government decreased, there was less demand for foodstuffs, and there was an unusual demand for precious metal in Europe, with the result that it became difficult for banks in the United States to resume specie payments. Money became "tight," and in 1819 came a crisis. Prices began to fall, many businesses failed, and more careful living was necessary. Hard times was followed by a cry for relief, and relief was expected through protection.

Elections of 1820 and 1824. In 1820 Monroe was reëlected President without opposition. He received all the electoral votes but one, which was given to John Quincy Adams. The election of 1824 was of a totally different character. The "era of good feeling" had left the country without political parties, and the personal question became the most important one. At first there were six candidates, Jackson, Adams, Clay, Crawford, Calhoun and Clinton of New York. Calhoun and Clinton soon withdrew, and the former was later elected Vice-President. As all the candidates belonged to the same party, the stump speakers and newspapers talked about personalities. Adams wrote in August that "the bitterness and violence of Presidential electioneering increase as the time advances. It seems as if every liar and calumniator in the country was at work day and night to destroy my character." Crawford was called corrupt; Jackson was denounced as a murderer; and Clay was labeled the gambler. When the result of the election was known it turned out that Jackson had received ninety-nine electoral votes; Adams, eighty-four; Crawford, forty-one; and Clay, thirty-seven. This result threw the election into the House of Representatives.

According to the Constitution the House of Representatives was limited to a choice between Jackson, Crawford and Adams. Clay was deeply disappointed, the more so because the five votes of Louisiana were said to have been lost to him by trickery. Instead of being made President, he now found himself able to make a President, for his influence in the House of Representatives commanded sufficient votes to decide the election. The story of this episode has been told again and again. Clay was urged to give his support to Jackson, then to Crawford, and finally to Adams. But weeks before the election in the House, Clay's mind was made up, and in a letter to a friend he stated that he would lend his influence to Adams, because he could not vote for Crawford, who was a helpless paralytic, and because he did not think that a military hero was a fit man for the Presidency. Even before the vote was taken Jackson's managers attempted to prove that a "corrupt bargain" existed between Clay and Adams, but no evidence to support this charge was ever found. On February 9, 1825, the House elected Adams.

Monroe's Last Years. Thus Monroe's successor was chosen less than a month before the end of the latter's term. Monroe retired to private life, spending part of his time on his Virginia estate and part in New York City. With his two predecessors as President, Jefferson and Madison, he served in 1826 as a regent of the University of Virginia, and in 1829 was a member of the Virginia constitutional convention. He died at New York on July 4, 1831, five years after the deaths of John Adams and Thomas Jefferson. His remains rest at Hollywood, Richmond, Va. W.F.E.

Consult Gilman's *James Monroe, in His Relation to the Public Service;* also his *James Monroe,* in American Statesmen Series.

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MONROE, La., the parish seat of Ouachita Parish, is situated on the east bank of the Washita River, in the north-central part of the state. Baton Rouge, the state capital, is 155 miles southeast, Shreveport is ninety-seven miles west, and Vicksburg, Miss., is seventy-six miles east. Monroe is served by the Arkansas, Louisiana & Gulf, the Vicksburg, Shreveport & Pacific and the Saint Louis, Iron Mountain & Southern railroads, and by steamboats which ply the river from New Orleans to Camden, Ark. The area of the city is nearly five square miles. The population, which in 1910 was 10,209, was 13,214 in 1916 (Federal estimate).

Monroe is situated in one of the best agricultural sections of the South and has a large trade in cotton and lumber. The principal industries are machine shops, cotton compresses, cottonseed oil mills and manufactories of automobile and wagon materials and other lumber products. The city has a Federal building, courthouse, city hall, public library, market house, salt-water natatorium, Saint Francis Sanatarium and a city park of fifty acres.

A settlement on the site of Monroe was made in 1785 while Louisiana belonged to the Spanish. In 1819 the place was renamed Monroe, in honor of James Monroe, then President. It was incorporated in 1820 and received city charters in 1871 and in 1902.

MONROE DOCTRINE, the name applied to the policy of the United States toward preserving the independence and safety of the Latin American states. The Doctrine was first clearly stated by President Monroe in a message of 1823, though the main ideas of that message, and some of the wording, are due to John Quincy Adams, then Secretary of State. The reason for the pronouncement of the Doctrine was that by the American Revolution, and then by the revolt of the Latin American colonies, a new kind of state was created in the world. Up to 1775, every civilized person in North and South America was the subject of some European power. It was a new thought that American colonies could establish themselves as independent and sovereign nations. The ideas of the Monroe Doctrine are as follows:

(1) **Two Spheres.** It was held that the world was divided into "two spheres," the Eastern hemisphere and the Western. President Washington stated one side of that principle in his doctrine of "Isolation," which was that the United States was not called upon to take part in the affairs, and especially in the wars, of Europe. The other side, as worked out by Adams and Monroe, was that European powers ought not to interfere in the affairs of Americans. They recognized that Great Britain had large interests in Canada and the West Indies, and that France and some smaller European nations had small interests in the West India Islands and the coast of South America. As Monroe put it in his message, "With the existing colonies or dependencies of any European power we have not interfered and shall not interfere." He goes on to say: "But with the governments who have declared their independence and maintained it, and whose independence we have . . . acknowledged, we could not view any interposition for the purpose of oppressing them or controlling in any other manner their destiny by any European power in any other light than as the manifestation of an unfriendly disposition towards the United States."

(2) **Political System.** Monroe wrote, "The political system of the allied powers is essentially different . . . from that of America. We owe it, therefore, to candor, and to the amicable relations existing between the United States and those powers, to declare that we should consider any attempt on their part to extend their system to any portion of the hemisphere as dangerous to our peace and safety." By "political system," Monroe meant the combination of European powers commonly called the Holy Alliance (which see), which was threatening to invade Latin America in order to restore the new states to the rule of Spain and Portugal.

(3) **Colonization.** In his message Monroe said, "The American continents, by the free and independent condition which they have assumed and maintain, are henceforth not to be considered as subjects for future colonization by any European powers." This was directed against Russia, which laid claims to the Pacific coast of America as far south as the fifty-first parallel.

(4) **Peace.** The purpose of Monroe and Adams was to prevent wars of conquest in America and especially to avoid wars which might spring up between the United States and new European neighbors.

(5) **Enlargements.** The message of 1823, with its strong statement of the position of the United States, broke up all the plans for invasion; and only once since has a European power attempted to plant a colony in defiance of the Monroe Doctrine. This was the French

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occupation of Mexico (1861-1867). Secretary Seward did not at that time use the expression "Monroe Doctrine" in his dispatches, but he gave the French plainly to understand that they must leave Mexico or the United States would compel them to go.

The original Monroe Doctrine has been much altered and enlarged by public statements made by Presidents and Secretaries of State, especially President Polk in 1845; by President Grant in 1869; by Secretary Evarts in 1880, who used the new phrase "the paramount interest of the United States." President Cleveland, in 1895, took the extreme position that the Monroe Doctrine was international law binding on Great Britain, and that it was violated when Great Britain refused to arbitrate the boundary question with Venezuela. Secretary Olney went further by the statement that "to-day the United States is practically sovereign on this continent and its fiat is law upon the subjects to which it confines its interposition."

The delegates of the United States to the Hague Conferences expressly reserved from the operations of the Hague Conventions our "traditional attitude toward purely American questions." President Roosevelt extended the doctrine to cover the case of a European power which might attempt to seize or occupy the territory of an American state in order to secure payment of claims. At the same time he announced that the United States would itself deal with American neighbors which refused to make proper amends to European powers. This is the so-called policy of "the Big Stick."

The Monroe Doctrine has never been expressed in a treaty or an act of Congress, and it has undergone many changes in the course of a century. Nevertheless its underlying principle is that European powers shall not come in and alter the map of America, which would be to the disadvantage of the United States; and that principle is firmly held by the American people. A.B.H.

Consult Taft's *The United States and Peace;* Bigelow's *American Policy;* Kasson's *Evolution and History of the Monroe Doctrine.*

MONROVIA, *mon ro' vi a,* the capital of the negro republic of Liberia, in West Africa, situated on the Atlantic coast at the mouth of the Saint Paul River. It is a port of entry, visited regularly by seven lines of steamers, from Great Britain, Germany and Spain. The principal exports are rubber, coffee, palm nuts, palm oil and dyewoods. Monrovia is the seat of Liberia College, was founded in 1824 and named for President James Monroe. See LIBERIA. Population, about 6,000.

MONSOON, *mon soon',* the seasonal wind on the Indian Ocean which blows in an almost steady gale from the southwest from April to October. Although this part of the world lies where the trade winds blow from the northeast during the other half of the year, the heat equator moves so far north during the summer that the direction of the wind is forced to change, for cool air, which is heavy, naturally rushes in where the light, warm air is rising. These summer winds generally are accompanied by rain in portions of India and the East Indies, so sailors have called them the *wet monsoons,* while the trade winds are often termed the *dry monsoons* in this section. When the rain fails to accompany the southwest monsoon, as it did in the years 1895, 1896 and 1899, terrible famines occur in India and the East Indies, causing a great loss of life. See map, WIND.

MONTAIGNE, *mon tane',* MICHEL EYQUEM DE (1533-1592), a French writer who has the honor of having initiated the essay form of literature. He was born at the Castle of Montaigne in Périgord, and until the age of six was taught to speak nothing but Latin. After that time he became a pupil at the Collège de Guyenne at Bordeaux, and when thirteen began the study of law. Little is known of his youth and early manhood, but from 1554 until 1567 he was a parliamentary counselor. His first literary work was the translation of the *Natural Theology* of Raimond Sebond. In 1571 he succeeded to his father's estates, and in 1580 traveled extensively in Switzerland, Italy and Germany for health, instruction and pleasure.

During this life of leisure he began to write the essays for which he is famous, doing this, as he said, because he felt the need of occupation. These essays, which have held the attention of readers for over 300 years, were inspired by the caprice of the moment and touched upon all kinds of subjects, even upon the tastes, habits and thoughts of his own daily life, and have exercised a lasting influence on the world's thought and writing. His *Voyages,* a diary of his travels, was first published in 1774. The translations of Montaigne's essays by Florio, revised by Hazlitt in 1893, are still the standard English version. It was Florio's version with which Shakespeare was familiar, and this same translation had an influence on the writing of Bacon, the greatest English essayist. See ESSAY.

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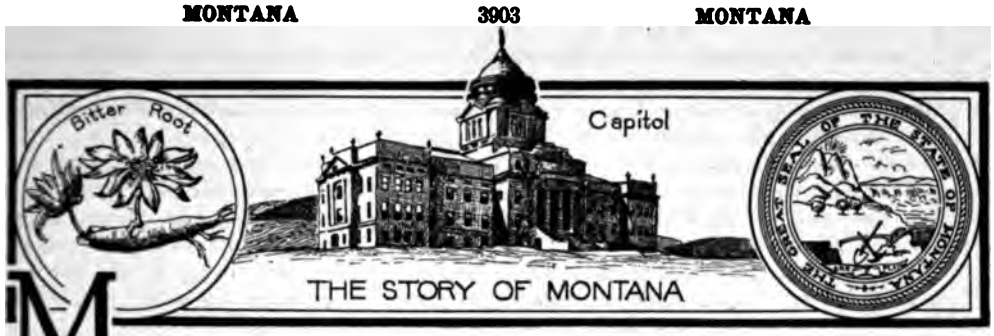

MONTANA, *mon tah' na*, a northwestern state of the American Union, popularly named THE TREASURE STATE because of its great wealth in copper, silver, gold and coal, its large production of wool, and its beautiful natural scenery. The name is derived from the Spanish word *montana*, which means *mountainous*, and clearly indicates the physical character of the state. One of the great beauty spots in the United States, the Glacier National Park, is within its borders, while one entrance to the Yellowstone National Park is also in this state. As its flower, Montana has chosen the bitterroot.

Size and Location. Among the states of the Union only Texas and California are larger than Montana, which has an area of 146,997 square miles. It is therefore about three times the size of New York, and is equal in extent to the combined areas of the United Kingdom, the Netherlands and Belgium. Its greatest length from east to west is 540 miles, as far as from Duluth to Saint Louis, and its average width from north to south is 275 miles.

Its People. With 376,053 inhabitants in 1910, Montana ranks fortieth among the states. It contains about the same number of inhabitants as the province of Alberta, one of its neighbors across the international boundary; the latter is, however, of much larger size, having 100,000 square miles more territory. The most thickly-settled regions are the western mining districts. The average density of population for the state in 1910 was 2.6 persons to the square mile. On January 1, 1917, the Federal Census Bureau estimated the population at 466,214. A characteristic feature of its population is the great preponderance of males, who numbered 226,872 in 1910, as against 149,181 females. This means that there were 152 men to every 100 women. Of the population in 1910, 43.1 per cent were native whites of native parentage; 28.4 per cent were native whites of foreign or mixed parentage; 24.4 per cent were foreign-born whites. Of the foreign-born population 14.7 per cent came from Canada; 10.3 per cent from Ireland; 9.8 per cent from England, and about the same proportion from Germany, Austria, Norway, Sweden and Italy, respectively.

Nearly two-thirds of the people live under rural conditions. The principal cities are Helena, the capital; Butte, the most populous city; Great Falls, Billings, Bozeman, Anaconda, Miles City and Missoula.

Indians. In 1910 the Indians numbered 10,745, and formed 2.9 per cent of the total population. They belonged chiefly to the Assiniboin, Blackfeet, Chippewa, Gros Ventres, Pend d'Oreille and Sioux tribes. All of them live now on government reservations in various parts of the state; these contain 4,312,452 acres of agricultural and grazing lands.

Education. Considering its scattered population, educational conditions in Montana are excellent. The permanent school fund consists of public school lands of great extent, and this source of income is supplemented by state and local taxation. The state has a good compulsory education law; the schools are under the supervision of a state board of education and of a state superintendent of public instruction, elected by the people for four years. Each county has its own superintendent, elected for two years. The percentage of those unable to read or write was 4.7 in 1910.

At the head of the educational institutions stand the University of Montana at Missoula, opened in 1895; the College of Agriculture and Mechanical Arts at Bozeman, opened in 1893; the School of Mines at Butte, opened in 1900, and the State Normal College at Dillon. These four state institutions are administered under one head, the Chancellor of the University of Montana. Other educational institutions are the Montana Wesleyan University at Helena, and the College of Montana at Deer Lodge, maintained by the Presbyterians. A number of experimental substations in agriculture and horticulture are maintained, and the United States Department of Agriculture established

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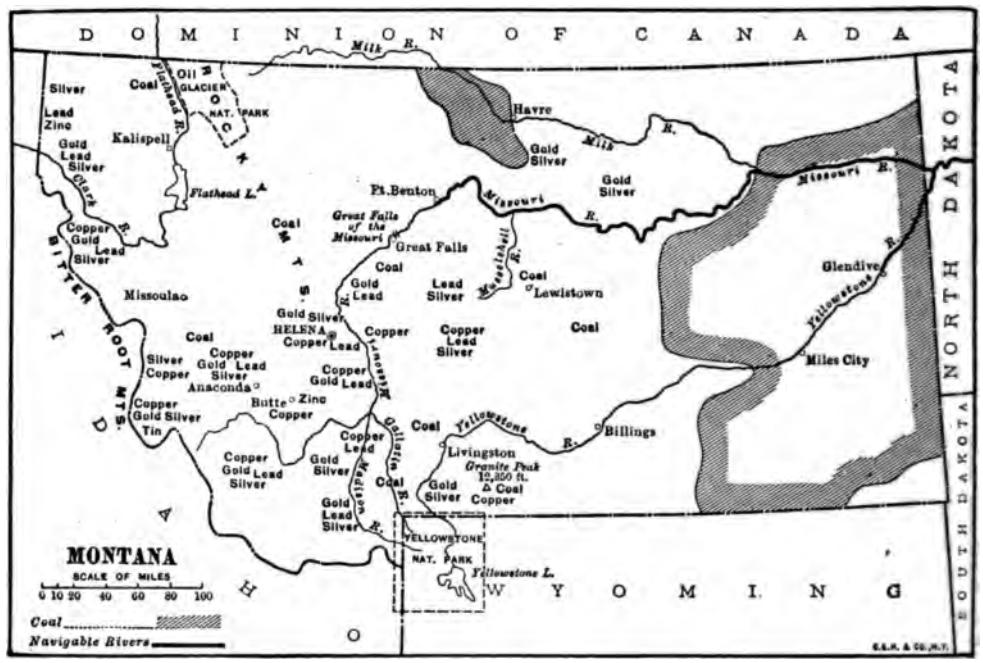
in 1911 an experimental farm on the Huntley reclamation project.

Religion. The Roman Catholic Church is the strongest, possessing more than sixty per cent of the total Church membership of the state. Of the Protestant churches the Methodists, the Presbyterians and the Episcopalians, in the order named, are the most numerous.

Physical Features. The eastern three-fifths of the state belong to the great central plain, and the surface consists almost entirely of rolling prairie, which rises gradually to meet the foothills of the Rocky Mountains to the west. No portion of Montana lies at a lower altitude than 1,000 feet above sea level, while over one-half of the state has an altitude varying between 1,500 and 3,000 feet. In the prairie region there are isolated *buttes,* or hills, and bluffs occur along the streams. Some of these elevations have been sculptured in a wonderful manner by the winds, and are interesting objects (see EROSION). The main range of the Rocky Mountains extends from the Yellowstone Park across the state in a northwesterly direction. About 100 miles west of the main range is found the Bitter Root range, which forms over half of the western boundary of the state. Between these two mountain ranges lies a broad basin, whose surface is greatly diversified by numerous spurs and cross ranges. This region is remarkable for the beauty and grandeur of its scenery.

The mountainous portion of Montana contains many lofty peaks, the most noted being Granite Peak, 12,850 feet high; Mount Douglas, 11,300 feet; Mount Powell, 12,000 feet, and Gallatin Peak, 10,967 feet. In the northern mountainous district of this state is situated the Glacier National Park.



OUTLINE MAP OF MONTANA

Showing the boundaries, principal rivers, largest cities, coal measures, mineral deposits, and the highest point of land in the state.

Rivers. The main range of the Rocky Mountains constitutes the Continental Divide, which separates the basin of the Missouri from that of the Columbia. The portion of the state west of the Rocky Mountains is drained by the Clark River and its tributaries into the Columbia; the region east is drained by the Missouri, which rises in this state. The Yellowstone and the Musselshell, both tributaries of the Missouri, are the other principal rivers in Montana.

In its waters Montana possesses a great source of potential wealth, for there are several waterfalls that are among the highest in the world. These are the Upper Yellowstone (310 feet high); the Lower Yellowstone (110 feet); and the Missouri (90 feet). The Missouri is

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navigable to Fort Benton, not far below the Great Falls, and the Yellowstone is also navigable for small boats for about 300 miles. The only lake of importance is the Flathead, situated in the northwestern part of the state.

Climate. Like most inland regions, Montana possesses what is known as a continental climate, and experiences a wide range of temperature. Thus in winter the thermometer sometimes falls as low as 40° below zero, while in summer it rises to over 100° above. But on account of its altitude and the dryness of the air the heat in summer is not oppressive, while the *chinook* winds, which bring warm and dry air when they arrive in Montana, make the winters much milder. The mean annual temperature for the state is about 11° F. for the coldest, and 70° F. for the warmest, month. The rainfall averages about fifteen inches in the eastern regions to about twenty inches in the west, while the northwestern corner has a still greater rainfall.

Resources and Industries

Forests. Imagine for one moment the whole state of Pennsylvania to be one continuous forest and you will gain an idea of the extent of territory the forests of Montana occupy. They cover about 42,000 square miles, which represents nearly one-third of the area of this large state. The chief trees are yellow pine, white pine, red fir, white fir, hemlock and larch. The yellow pine often attains a hundred feet in height and five to seven feet in diameter, and is the most useful timber tree in the state.

Agriculture. The vast rolling prairies, the extensive alluvial bottom lands, and a great number of the valleys, offer a large field for agricultural pursuits. It is therefore little to be wondered at that agriculture is making great strides, especially in the regions where irrigation works have been constructed. Of the total land surface, amounting to 93,568,000 acres, about 15 per cent is occupied by farms.

When the agricultural census was taken in 1910 hay was by far the most important crop in Montana. The area under hay cultivation was twice as great as that under all cereals, and its value was also greater than that of all the cereals combined. Since that time the growing of wheat has assumed such proportions that it has surpassed hay in value as well as in acreage, while oats hold a position nearly as important. In 1915, a year of great crops throughout North America, Montana raised more than 33,000,000 bushels of wheat and 31,000,000 bushels of oats, and its hay crop was over 1,500,000 tons. Other important crops are flaxseed, potatoes, corn and sugar beets. The eastern part of the state is devoted principally to dry farming and grazing. In the mountain valleys are found large orchards, as these regions are remarkably well suited to the growing of apples and other orchard fruits.

Over ninety per cent of the farms of Montana are operated by owners or their managers, and less than ten per cent by tenants. The great majority of the farms have been acquired by their owners from the government or from private corporations in the form of homesteads (see HOMESTEAD LAWS), and by entries on irrigated lands. Most of these have been obtained at a small price, or on long time credit, and this has made it possible for farmers of small means to become owners.

Irrigation. Montana ranks third among the states of the Union as regards the area of its irrigated lands, coming after Colorado and California. About one-third of its total farm acreage is irrigated. Irrigation is resorted to throughout the state, but seventy-five per cent of the irrigated land is situated in the western mountainous section. Montana had 1,679,084 acres of irrigated land in 1910 and projected works will irrigate nearly 1,000,000 acres more before 1920. The most important of these are the Huntley, the Milk River and the Sun River projects, for irrigating 32,688 acres, 219,557 acres and 174,046 acres, respectively. The Lower Yellowstone project for irrigating 60,000 acres in Montana and North Dakota, completed in 1915, is also worthy of mention, also the Flathead project, 152,000 acres; Fort Peck project, 152,000 acres, and Blackfeet project, 122,500 acres, all three of which are for the benefit of the Indians.

Live Stock. A striking characteristic of Montana is the great area of semiarid land utilized for grazing purposes. Many large farms, or ranches, frequently exceeding 100,000 acres in extent, are located in the state. Not many regions in the United States offer greater advantage to the stock raiser. The bunch grass and buffalo grass found on Montana plains are remarkably nutritious and well suited for fattening stock.

For a number of years Montana has been the leading state in the Union in the quantity and

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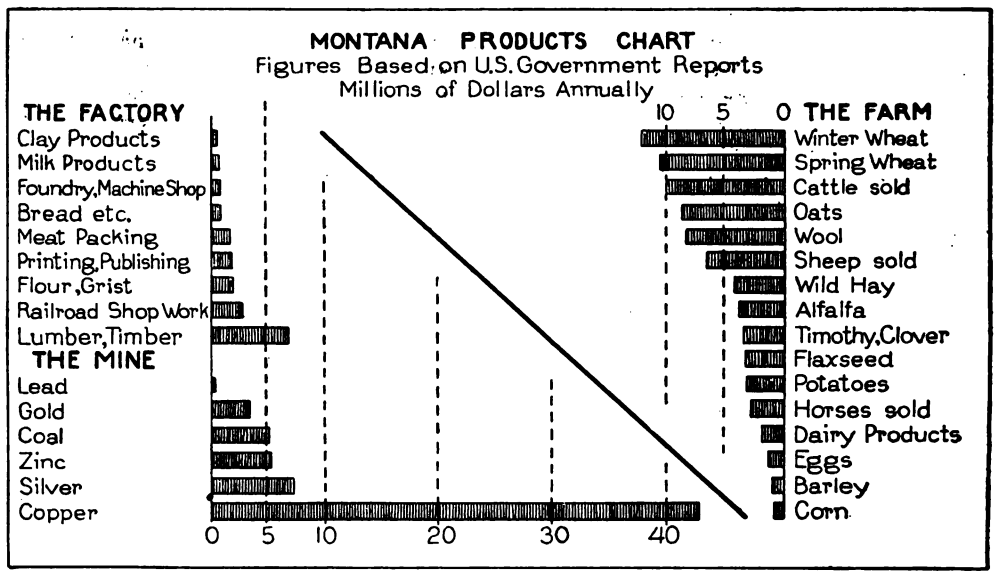
value of its wool production, but is now about equaled by Wyoming. The wool clip amounts each year to about 30,000,000 pounds of raw wool, or 11,000,000 pounds of scoured wool. The number of Montana's sheep, nearly 5,000,000 in 1909, decreased to about 4,000,000 in 1916, and was exceeded in Wyoming and nearly equaled in New Mexico. The breeding of horses has become an important industry. Miles City, where the United States army has one of its remount stations, is now one of the greatest horse markets in the nation.

Mining. Montana is one of the richest states in mineral wealth, and mining has been its leading industry ever since gold was discovered in this region in 1861. But the state has become most famous for its copper mines. Around Butte is found one of the richest copper mining regions in the world. Montana was for many years the leading state in the production of copper, but since 1906 its output has been surpassed by Arizona. It has contributed more than six and a half billions of pounds of copper, which represents about one-third of the total output of copper in the United States since 1845. Nearly 300,000,000 pounds are mined annually.

Next in importance is silver, which is obtained chiefly as a by-product in the smelting of copper. With a production of 12,000,000 ounces, valued at about $7,000,000, each year, Montana usually takes second rank, surpassed only by Nevada. Gold (200,000 ounces produced in a year) and zinc are other leading minerals. Coal is being mined in larger quantities every year, the bituminous yield being nearly 3,000,000 tons. According to a report of the United States Geological Survey, the Fort Union coal region in eastern Montana is one of the largest fuel-bearing areas in the world; it is estimated that this region contains forty-five billions of tons of coal. The whole state is believed to contain nearly four hundred billions of tons.

Montana is the leading state in the Union in the production of precious stones. This is due to the mining of sapphires, one of the few gems thus far found in the United States. Most of the gems, of an average yearly value of $250,000, are sent to Switzerland, where they are used as jewels in the manufacture of watches. The total value of the mineral products has in some years been over $70,000,000.



Manufactures. As it is to be expected under conditions which are described above, the smelting and refining of copper is by far the most important manufacturing industry, and great smelter mills are located at Anaconda, Great Falls, Butte and East Helena. Next in importance is the manufacture of lumber and timber products. Over one hundred great sawmills are engaged in this industry, the largest ones being established at Hamilton and Bonner. Most of the timber milled is yellow pine and larch, Montana taking first rank in the production of the latter. The beet-sugar indus-

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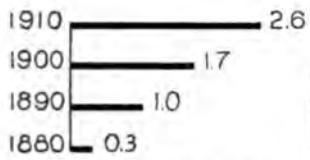
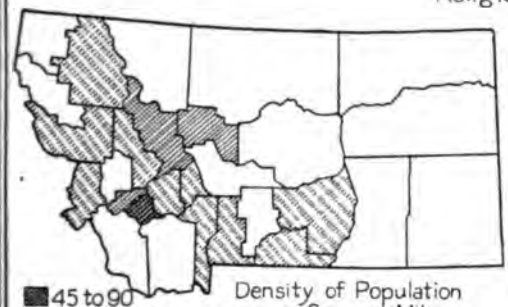


People per Square Mile by Decades

Religions

Location of Glacier National Park



Density of Population per Square Mile

A Typical Copper Mine

Grinnell Mountain and Lake McDermott, Glacier National Park

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try is developing rapidly, and a large sugar factory is established at Billings.

Transportation. Three great trunk lines cross Montana from east to west; these are the Great Northern in the north, the Chicago, Milwaukee & Puget Sound in the center, and the Northern Pacific in the center and south. The Oregon Short Line enters from Idaho and extends to Butte; the Chicago, Burlington & Quincy enters from Wyoming and runs to Billings and Great Falls. Each of these lines has a number of branch lines, or feeders. At the end of 1914 the state had 4,846 miles of railroad. Although the railway mileage is increasing each year, there are still large areas where stages are the only means of conveyance. In the mountain regions saddle horses and pack mules are largely used.

Government and History

State Constitution. Montana is governed under the constitution adopted in 1889, the year the state was admitted to the Union. In 1906 an amendment was adopted which provided for the initiative and referendum. In 1914 another amendment granted the franchise to women on the same terms as to men. This victory for women was due in large measure to the untiring efforts of Miss Jeanette Rankin. The people of the state rewarded her with election, in November, 1916, to the national House of Representatives—the first woman who was ever accorded that honor. She took her seat at the special war session of Congress, in April, 1917 (see RANKIN, JEANETTE).

Other Constitutional Provisions. A period of eight hours constitutes a legal day's work in all undertakings carried on by the state, counties or towns, and on all contracts given out by them, as well as in mines, mills and smelters for the treatment of ores. It is not legal to employ children under sixteen years of age in underground mines. The granting of injunctions in suits arising from labor disputes is prohibited.

The executive officers—governor, lieutenant-governor, secretary of state, attorney-general, treasurer, auditor and superintendent of public instruction—are elected for four years. All of them are eligible to reëlection except the treasurer. The governor, lieutenant-governor and superintendent of public instruction must be at least thirty years of age at the time of their election. The governor cannot veto any measure referred to the people by the legislative assembly or by initiative and referendum petitions. The governor's veto of any bill can be overridden by a two-thirds vote of both houses of the legislature. Among the special offices created recently are that of state fire marshal and state sealer of weights and measures.

The legislative authority consists of a senate and a house of representatives. Representatives are elected for two years; senators, one from each county, for four years, but half of the senate is renewed every two years. In 1915 the house of representatives consisted of ninety-three members, and the senate of thirty-nine members. The sessions of the legislature are held every two years, beginning on the first Monday in January in odd numbered years, and are limited to sixty days. Montana sends two members to the United States House of Representatives.

At the head of the judicial department is the supreme court, composed of three judges, each elected for six years. Below this are the district courts, each having one or two judges elected for four years. Justices of the peace are elected for two years.

For purposes of local government the state is divided into counties, but the most important government units are the cities and towns. A charter of incorporation may be granted to any town having 2,000 inhabitants, and such towns are given the right to adopt the commission form of government. A primary law provides for party nominations by direct vote for all national, state, county and municipal offices.

Charitable and Penal Institutions. The state maintains a soldiers' home at Columbia Falls; a home for orphans, foundlings and destitute children at Twin Bridges, and a school for deaf, blind and feeble-minded at Boulder. The insane asylum is at Warm Springs, and the state also maintains a sanitarium for persons suffering from tuberculosis. The state prison is at Deer Lodge, and at Miles City there is a reformatory school which provides manual and industrial training for young offenders between the ages of eight and eighteen years. The penal and charitable institutions are under the supervision of a state board of charities and reform, which consists of three members appointed for six years.

History. The present state of Montana was part of the territory that the United States

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RESEARCH QUESTIONS ON MONTANA

(An Outline suitable for Montana will be found with the article "State.")

What special effort does the state make to provide against danger from fire?

What per cent of the total acreage is in farm lands?

If this farm land made up one continuous region, what state of the Union would it most nearly resemble in size?

What "by-product" has a value of over $6,000,000 annually?

According to present estimates, how long would the coal of Montana last if fifteen million tons were mined each year?

What famous general was killed by the Indians within the borders of this state?

What is the source of the school funds of the state?

What state is about the size of Montana's forested region? What tree is the most useful commercially?

What change has taken place in the relative importance of mineral products since 1861?

How many states surpass Montana in the production of its most valuable mineral output?

When did this territory come into the possession of the United States? To what country had it previously belonged?

How many people out of every hundred are Indians? How much land, on the average, does each Indian have allotted to him in the reservations?

Why is the summer temperature more endurable in this state than in many of the states farther east?

What is the *chinook?* What effect does it have?

How many sheep are there in the state? How much wool, on the average, is clipped from one sheep in a year?

How old must a boy be in this state before he can work in a mine?

How large a proportion of the people live in cities or towns?

How does Montana's loftiest waterfall compare in height with the falls of Niagara?

For whom is the largest lake in the state obviously named?

What use is made of much of the land which is too dry for the production of crops but is not desert?

How many constitutions has Montana had since it became a state?

How many states have a larger population? How many of these more populous states are larger?

If Montana and the smallest state in the Union could exchange populations, how much greater would the population density of the former be than it is at present?

What part has this state in the formation of the longest river in the world?

How does some of the drainage of the state reach the Pacific?

How much smaller would the farm area be if there were no irrigation?

Of what do the transportation facilities in the mountain regions largely consist?

What is the railroad mileage to each hundred square miles of area?

What three important countries of Europe have a combined area about equal to that of Montana?

How have more than half of the farms of this region been acquired by their owners?

What does the name *Montana* mean? Explain the popular name.

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bought from France in 1803 by the Louisiana Purchase. The famous expedition of Lewis and Clark to the Pacific coast crossed this region in 1804 and 1805. The first permanent settlement was established at Fort Benton in 1846 by the American Fur Company. The real beginning of development was in 1861, when gold was discovered in the mountains. People flocked to these regions, and mining settlements rapidly appeared. In 1863 gold was discovered at Fairweather Gulch, near Alder Creek, and within a year the town of Virginia City, which was established near that spot, numbered 4,000 inhabitants.

Montana at first had been included in the Territory of Idaho, formed in 1863; in 1864 it was established as a separate territory. In 1874 the capital was removed from Virginia City to Helena. In 1876 occurred the disastrous fight on the Little Big Horn River between General Custer and the Sioux Indians under Sitting Bull. The rich copper mines around Butte were soon discovered, and from 1880 the mining of copper and silver became very important; in fact, for a long time afterwards the whole political and economic development of Montana was influenced by its copper mines.

In 1883 the Northern Pacific Railway was completed, and the development of the territory advanced very rapidly.

Admission as a State. In 1884 a constitutional convention framed a constitution that was ratified by the people, and application was made to Congress for its admission as a state. It was not until 1889, however, that Congress passed the enabling act for its admission, and on November 8, 1889, Montana became the forty-first state of the Union. From that time the state has advanced rapidly, both economically and politically. Labor troubles have been frequent since 1907, when a strike of long duration took place in Butte and in other cities. The Socialists have gained many adherents, and in 1911 they succeeded in electing their candidate as mayor in Butte. The people in 1916 voted for statewide prohibition, to go into effect January 1, 1919.

In national politics Montana was Republican in 1892; Democratic and Populist in 1896 and 1900; Republican again in 1904 and 1908. Woodrow Wilson carried the state for the Democrats by a small majority in 1912, and by 34,000 plurality in 1916. J.D.D.

Consult *Montana*, issued by the state department of agriculture; Linderman's *Calendar of Historic Events in the History of Montana.*

Related Subjects. The following articles in these volumes contain much information that will be of interest in connection with a study of Montana:

CITIES

Anaconda	Great Falls
Billings	Helena
Bozeman	Missoula
Butte	

LEADING PRODUCTS

Apple	Oats
Copper	Sapphire
Gold	Sheep
Hay	Silver
Horse	Wheat
Lumber	Wool

PHYSICAL FEATURES

Butte	Rocky Mountains
Missouri River	Yellowstone River

RESERVATIONS

Glacier National Park	Yellowstone National Park

UNCLASSIFIED

Dry Farming	Lewis and Clark Expedition
Irrigation	

MONTANA, UNIVERSITY OF, a coeducational institution, organized at Missoula in 1895. Three years previous to its opening Congress endowed the university with a public-land grant of seventy-two sections. The annual income from land unsold is about $30,000, supplemented by legislative appropriation, making the net annual income $175,000. The university buildings, which are on a campus of forty acres, are valued at $200,000. Courses are offered in science, literature and arts, law, pharmacy, forestry, journalism, music, domestic science and commerce and accounting; and there are also maintained a school of education, a university extension department, correspondence courses, a bureau of public information, a summer school and a biological station. Tuition is free to students residing in Montana. The university is equipped with a library of 35,500 volumes; it has a faculty of over sixty members and a student enrolment in 1915-1916 of 1,028. J.D.D.

MONT BLANC, *mawN blahN'*, meaning *white mountain,* is the highest mountain of Europe, the most famous peak on the Continent, and one of the most notable in the world. It is situated in the Pennine Alps, the loftiest and most important range of the Alpine system. The mountain lies southwest of Alleé Blanche and northeast of the beautiful vale of Chamouni, in the province of Haute Savoie, France, near the frontiers of Italy and Switzerland. The huge mountain mass, composed

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chiefly of granite, is about thirty miles long and ten miles wide. The highest of its several summits, which is in France, rises 15,782 feet. The lower slopes are covered with dense woods penetrated by swiftly-rushing streams. Great glaciers creased with deep crevasses cover the summits and upper slopes. The most remarkable of these glaciers is the *Mer de Glace,* winding down the north slope towards Chamouni and giving rise to the River Arve.

The dangerous ascent of Mont Blanc was first accomplished in 1786 by Jacques Balmat, a guide, and shortly afterward by Dr. Paccard, a local physician. In the following year De Saussure, the naturalist, reached its summit and in 1840, when the Italian naturalist, Imperial de Sant-Angelo, made the ascent, thirty-three daring travelers had preceded him. The whole journey can now be made in fifty or sixty hours. Natives of the region act as guides and several lodges for the shelter of tourists have been built along the passes.

MONTCALM DE SAINT-VERAN, *mohN kahlm' de saN va rahN',* LOUIS JOSEPH, Marquis de (1712-1759), a French general who gave his life for his country in the last great struggle between the French and English for supremacy in America (see FRENCH AND INDIAN WARS). He entered the army when a boy of fourteen, won distinction in the War of the Austrian Succession, and in 1756, having then attained the rank of brigadier-general, was appointed to the chief command of the French forces in Canada. His operations against the English were at first brilliantly successful, including the capture of Fort Ontario and of Fort William Henry, on Lake George, and the occupation of Ticonderoga. As the war progressed it became evident that the crucial point of the struggle would be the English attack on Quebec, in preparation for which Montcalm concentrated his main forces before the city early in 1759.

In July the gallant English commander, General Wolfe (see WOLFE, JAMES), made an unsuccessful frontal attack; a few weeks later, in September, by means of a narrow pathway he scaled the heights above the city and led out his whole force upon the Heights of Abraham. There, on the thirteenth of the month, the French and English armies met in open battle, and Canada was won for England. Wolfe died on the field in the moment of victory; his opponent, who was also mortally wounded, lived until the next morning. His last words were, "Thank God, I shall not live to see the surrender of Quebec." A noble monument to the memory of Montcalm and Wolfe has been erected on the battlefield, and to the French inhabitants of Canada Montcalm is as much of a national hero as is Wolfe to their English neighbors in other parts of the Dominion.

MONT CENIS TUNNEL. See CENIS.

MONTCLAIR', N. J., in Essex County, is a residential city in the northeastern part of the state, seven miles north and west of Newark, and fifteen miles northwest of New York City. It is on the Erie and the Delaware, Lackawanna & Western railroads, the Morris Canal and electric interurban lines. The population in 1910 was 21,550; in 1916 it was 26,318 (Federal estimate).

Montclair is principally the home of Newark and New York business men. Situated at the base and along the slope of the Orange Mountains, the streets rise one above another and offer splendid views of the surrounding country. From the highest altitude of the town, 650 feet, may be seen New York City and its harbor. The principal buildings are the Carnegie Library, the municipal building, the high school building, costing $650,000, Montclair Art Museum, club buildings and churches. The city has a state normal school, Montclair Military Academy, Mountainside Hospital and two orphan asylums.

The lower part of the town, known as Cranetown, then as West Bloomfield, was settled first and was a part of Newark, later a part of Bloomfield. Upper Montclair was first called Speertown. The name Montclair was adopted by the two sections in 1865, and they were incorporated as a town in 1894. H.L.M.

MONTE CARLO, *mohn'tay kahr'lo.* See MONACO.

MONTE CRISTO, *mohn'tay krees'toh,* a small barren island about twenty-seven miles south of Elba, in the Mediterranean Sea, belonging to Italy. It rises 2,000 feet above the sea and for many years remained uninhabited, but a penal agricultural colony was established there in 1874. The fame of the island is due to the elder Dumas, who gave the name to the hero of one of his most popular romances.

The Count of Monte Cristo. This great story, by Alexandre Dumas, was written in 1844 and 1845. The most thrilling part is the hero's discovery of fabulous treasure on the island of Monte Cristo, and of his escape from the Chateau d'If after fourteen years' imprisonment. The book was dramatized, and the play was given for years by leading actors, particularly James O'Neill.

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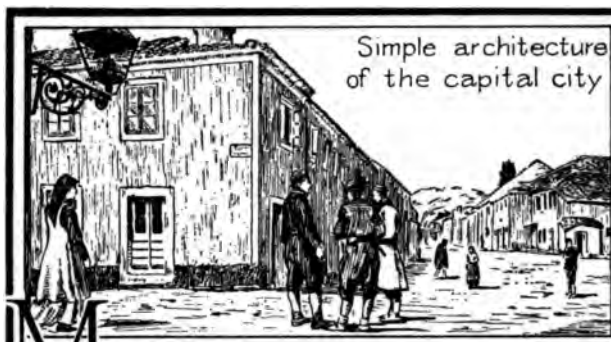

THE STORY OF MONTENEGRO

MONTENEGRO, *mon ta na' gro,* a small and ruggedly-picturesque European kingdom, situated in the western part of the Balkan Peninsula. Early in the War of the Nations, which began in 1914, it was unfortunately in the path of the southerly drive of the Austro-German armies, and after stubborn resistance gave way to overpowering military strength and lost its identity as a sovereign state. Its aged king and queen fled to Italy, the government was practically disbanded, and German arms ruled the little country. This article will describe the Montenegro of 1914, picturing conditions as they then existed and to which the nation may some day return.

Montenegro is quite irregular in shape, and lies between Austrian Dalmatia on the west, Herzegovina on the west and north, Serbia on the east and Albania and the Adriatic Sea on the south. Covering an area of 5,603 square miles, it is only a little larger than the state of Connecticut, and its population of about 516,000 is not quite half as great as that of the American state.

The name Montenegro means *Black Mountain,* and many explanations of its origin are given. One belief is that the name was suggested by the dusky appearance of Mount Lovchen in the south, under whose shadow lies what is known as "the cradle of Montenegrin liberty," the Katunska, or "Shepherds' Huts."

The People and Their Occupations. The Montenegrins are a primitive, warlike Serbian race speaking a Serbian dialect. The men are tall, muscular and well-proportioned. They are vain and lazy, but as warriors are brave, patriotic and chivalrous. No matter what they may be doing, they are usually fully armed, and military service is compulsory between the ages of eighteen and sixty-two. The women, though often beautiful when young, age quickly and remain short and stunted, for upon them falls the hardest work at home and in the fields. They are treated as inferior beings. Whereas the men wear gayly-colored, picturesque costumes, the women are usually attired in black.

Most of the houses in rural districts are of stone, with one door, one window and a straw roof without a chimney. Around each dwelling is usually a little plot of land planted to wheat, maize and potatoes, for the principal food consists of cheese, potatoes and maize

LOCATION MAP

(*a*) Montenegro
(*b*) Italy
(*c*) Germany
(*d*) Austria-Hungary
(*e*) Russia
(*f*) Rumania
(*g*) Bulgaria
(*h*) Serbia
(*i*) Albania
(*j*) Greece
(*k*) Turkey

cake, meat seldom being eaten. Primitive methods are still employed in agriculture, and stock raising is the most important industry. Cattle, sheep, goats, wool, hides and skins are exported. Tobacco, grapes and olives are raised to some extent, but the tobacco industry

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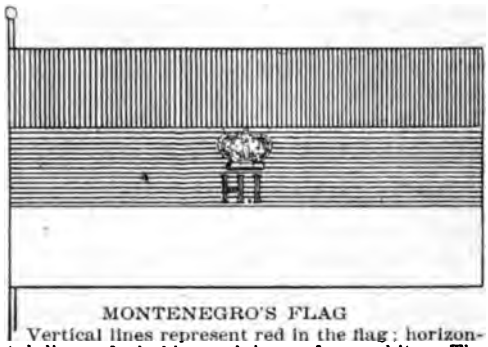
is in the hands of an Italian syndicate. Fine forests of oak, beech and pine in the mountains of the north are valueless, owing to lack of roads. The leaves of the sumach, used in tanning and dyeing, and pyrethrum (an insect powder obtained from the chrysanthemum) are articles of export.

Most of the Montenegrins are of the Orthodox Greek Church; others are Roman Catholic and Mohammedan. Although education is free and compulsory, the number of uneducated people is large.

The Country. The surface is principally mountainous, with here and there a few beautiful plains and valleys. The important streams are the Moratcha and the Zeta, which empty into Lake Scutari at the south. Some of the mountains rise to a height of 8,000 feet and are continually snow covered. The climate varies from severe, continuous cold in the high regions, to mild days in sheltered valleys. The average annual temperature is 58°. The vegetation ranges from Alpine on the summits, through forests of pine, beech and oak, to olives, oranges and crimson-blossomed pomegranates in lower regions at the south. Bears, wolves and foxes roam over wide areas. Hares are abundant where herbage is rich. Eagles, vultures, owls, nightingales, larks, herons, pelicans and ducks abound. Fish are numerous, the most important being the bleak, which is exported in large quantities.

Cities and Communication. The capital city is Cettinje, in the southwestern part of the country. Good carriage roads connect that city with others in all directions. Excellent roads also lead from Antivari and Dulcigno, seaports on Montenegro's twenty-eight miles of coast. Bridle roads are everywhere. A narrow-gauge railway about ten miles in extent connects Antivari with Vir Pazar on Lake Scutari, and steamers on that lake afford communication with other points. The construction of another railway from Antivari to Nikshich in the north has been begun. Telegraph lines connect the principal cities.

History. During the Middle Ages Montenegro formed part of the Serbian kingdom. When that realm was destroyed by the Turks in 1389, Montenegro became an independent principality, which then covered about 1,600 square miles. In spite of continuous struggles with the Turks, the Montenegrins bravely upheld their independence through the centuries. From the early part of the sixteenth century the ruler of the country was an elective prince-bishop, or vladika. In 1855 the vladika, Danilo, took the title of prince and transformed the land from an ecclesiastical to a secular principality, and its independence was soon recognized by Russia. In 1862 a not altogether successful war was waged against Turkey. Fourteen years later Montenegro again went to war with Turkey and gained large additional territory by the Treaty of Berlin, increasing its area to about 3,500 square miles. In 1912 Montenegro joined the other Balkan States in a war against Turkey, which further loosened Turkey's hold in Europe and added more territory to the kingdom of Montenegro (see BALKAN WARS). In August, 1914, Montenegro joined Serbia in war against Austria-Hungary and Germany and so became a factor in the War of the Nations (which see). Montenegro shared with Serbia the fate of a conquered nation as a result of the Germanic drive in 1915. O.B.



MONTENEGRO'S FLAG
Vertical lines represent red in the flag; horizontal lines, dark blue; plain surface, white. The crown and letters are red and gold.

Consult Trevor's *Montenegro, a Land of Warriors*; Denton's *Montenegro, Its People and Their History*.

MONTEREY, *mon te ra'*, the most important manufacturing city of Northern Mexico and the capital of the State of Nuevo Leon, is situated on the small Santa Catalina River, about forty-five miles northeast of Saltillo. It is about a hundred miles from the international boundary. When political conditions in Mexico permit, Monterey is frequented as a winter resort by residents of the Southern United States on account of its mineral springs and its charming situation at the head of a beautiful valley. In the vicinity are rich lead, copper and silver mines, and the city has important smelting works, iron foundries and woolen mills. The streets are good, and the houses are built of stone in the Moorish style. American capital had been heavily invested in and near the city before the beginning of the revolution in 1913. Population, 1910, 78,528.

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…EY, Battle of. An important bat-…ght September 24, 1846, in Monterey, … Mexico's principal stronghold during …ican War. General Taylor, with an …n force of about 6,000 men, stormed …tified city, which was defended by a …n force of 10,000 under General Am-… After four days of hard fighting the …ans surrendered. It was hoped that this …e would end the war, but Mexico con-…ed to fight, though weakened by a long …rse of revolutions. The Americans, how-…r, captured one after another of the Mexi-…n cities until the City of Mexico, the capital, …as occupied. Peace was concluded by the …reaty of Guadalupe Hidalgo, in February, 1848. See Mexican War.

MONTE ROSA, *mohn' tay ro' zah*, a snow-clad mountain mass in that portion of the Alps which forms the boundary between Piedmont, Italy, and the Swiss canton of Valais. Mont Blanc alone, among the Alpine mountains, surpasses Monte Rosa in altitude. The latter has eight main peaks, all more than 13,000 feet in height, and the loftiest of these, the Dufour Spitze, is 15,217 feet above the sea; its summit is less than 600 feet below that of Mont Blanc (which see). Monte Rosa has deposits of iron, copper, gold, mica, slate and gneiss, and there are several mines on its slopes. The steep, glacier-robed sides of the mountain make it very difficult to ascend, and its lofty passes are full of peril to the traveler.

MONTESQUIEU, *moN t' skyeh*, Charles de Secondat, Baron de la Brède et de (1689-1775), a French satirist and philosophical writer, whose *Persian Letters* won him immediate fame on their appearance in 1721. These letters purport to be the correspondence of two distinguished Persians traveling in France, and their criticisms of French life in all its phases are no less noteworthy for their humor than for their justness. Other important works were a history of Rome and *The Spirit of the Laws*, a standard work on certain phases of political science.

Montesquieu was born near Bordeaux, studied law and became eminent in his profession, but cared little or nothing for the routine of ordinary practice. For some years he was president of the parliament of Bordeaux. Though he had satirized the Academy in his *Persian Letters*, he was elected a member of …body in 1728.

…**…** *mon tes so' ree*, Maria (1870-… whose theories of … dopted in Europe a… Maria Montessori is … class Italian parents. As a bea… young woman, she gave evidence of unusual strength of character when she announced her determination to prepare herself for the medical profession. Such a procedure at that time was revolutionary, for she was opposed by the strongest of all barriers—social prejudice and tradition. She persisted, however, and in 1894 was awarded the degree of Doctor of Medicine by the University of Rome, being the first Italian woman to receive that honor. How she was led into the work for which she has become so widely known, and the principles and methods for which she stands, are fully treated in the article following, describing the Montessori Method.

MADAME MONTESSORI

Madame Montessori is a woman of vision. In one of her books she says, "Whoso strives for the regeneration of education strives for the regeneration of the human race." This statement represents the scope of her interests. Her devotion to the cause of child training is one expression of her love for humanity and her belief that the human race can develop only when it is given spiritual and intellectual freedom. She has identified herself with the woman's movement, and represented Italy at the International Woman's Congress in Germany, in 1898. Her efforts in her own city of Rome have met with opposition from religious and educational sources, but she won the support of the Queen Mother Margherita, through whose influence there was established a Montessori school in the Convent of the Via Giusti. In 1907 a school was opened in a tenement house in one of the poorest districts in Rome. Other schools followed, and thus was begun a movement that has gained world-wide significance. Montessori schools have been established in France, England, Smyrna and America.

Consult: Dorothy F. Fisher's *A Montessori Mother*; A. T. Smith's *The Montessori Method*; F. E. Ward's *Maria Montessori and the American School*; William Boyd's *From Locke to Montessori*.

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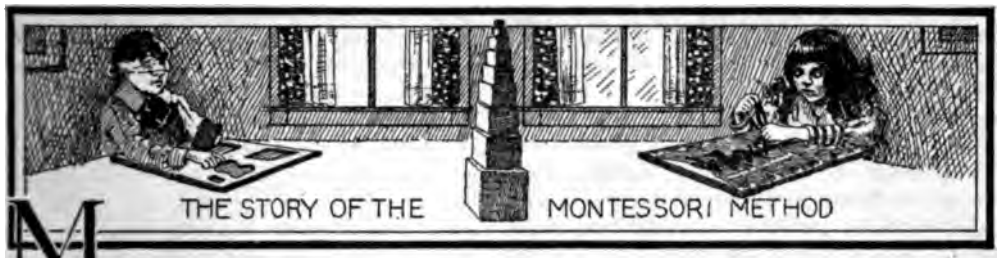

MONTESSORI METHOD. Dottoressa (Doctor) Maria Montessori began her career as a doctor of medicine, graduating brilliantly in medicine and surgery, at the University of Rome, when in her early twenties. She was the first woman in Italy to achieve this distinction, marking perhaps, in her courageous and single-handed struggle against almost unanimous opposition, the first step in her remarkable career of daring and innovation.

How the Method Developed. It was in her postgraduate days, during which she was occupying the position of assistant doctor at the psychiatric (mental disease) clinic of the university, that Dr. Montessori became interested in the treatment of feeble-minded children, with whose miserable lot in Rome at that time she came closely into contact. Drawn by the helpless appeal of these unfortunate children, who then received treatment no different from that given the actually insane, and perhaps conscious of a special vocation, she was led to specialize in this direction. Abandoning an already extensive private practice, she undertook the direction and reorganization of the state orthophrenic school, or asylum for deficient and feeble-minded children; this position she held for two years, giving her services gratis, and working from early morning till late at night. At the same time she gave free courses of lectures to teachers on the observation and training of defective children. In this work she may be said to have achieved her first striking success, children from her institute actually passing the state examination in reading and writing held for normal children.

The methods which she used in this institute were largely derived from the work of two men, whose influence may be traced throughout her subsequent development. Itard and Seguin were pioneers in the educational treatment of the mentally deficient. Itard had gained his principal experience in the training of a boy, "the savage of Aveyron," who had grown up abandoned to a life of nature in complete isolation from the society of man; and Seguin had devised means whereby deficients could really attain many of their normal powers, his methods, in his own words, following "the natural physiological development of the organism."

From the first, Dr. Montessori felt that there was nothing in the methods she was using inherently limited to the instruction of deficient children. "While everyone," she writes, "was admiring the progress of my idiots, I was searching for the reason which could keep the happy, healthy children of the common schools on so low a plane that they could be equaled in tests of intelligence by my unfortunate pupils.

"I believed that these methods contained educational principles more rational than those in use . . . and that similar methods applied to normal children would develop or set free their personality in a marvelous and surprising way." This idea was shortly to take absorbing hold of her mind, and led to renunciation of her work with deficients for the wider sphere of education of normal children.

Giving up every other occupation in order to broaden and deepen her conception, she reëntered the University of Rome as a student in pedagogy and philosophy, also studying experimental psychology and making researches in the schools in the science of man (anthropology). The last named led to her acceptance of a chair in Pedagogical Anthropology at the University of Rome, in which subject she delivered free courses of lectures for four years. At this time, also, she devoted herself to a more thorough study of the works of Itard and Seguin, translating them and copying them out with her own hand into Italian in order more fully to absorb their meaning. She also traveled in Europe, visiting schools and studying all aspects of modern pedagogy.

In 1906 the great opportunity came to her of testing her ideas in a practical way. An industrial society had undertaken the reform of some of the badly-constructed tenement dwellings in the poor quarters of Rome. These large blocks of apartments had been built hurriedly at a

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time of building speculation, and then becoming unoccupied, had fallen into disrepair. They had finally become the homes of the poorest of the poor, and because they had been designed for better-class families, all the evils of subletting and lack of privacy had set in. The society bought up these buildings, modified them to give sufficient light and air, divided up the apartments by partition walls, and relet them to the poor at reasonable rents. The society provided the inmates with certain advantages, such as a communal wash-house, baths, and sewing-room, and also laid out the courtyards with trees, flower beds and grassplots. The experiment was found to be a profitable one for the company in addition to the benefit derived by the tenants.

In return for this, the inmates were required to keep their homes clean and in order, and to respect the walls, stairs and courtyards of the building. It was found necessary, however, to provide some supervision during the day for the children under school age of the families in the tenement, since these, being still little vandals, and being left uncontrolled during the working-day of their parents, threatened to offset all the good which had been accomplished in securing the coöperation of their elders in the care of the building.

A large room was therefore set aside in each tenement for the supervision of these infants during the day, and this part of the scheme, under the fortunate title "Casa dei Bambini," or "Children's House," Dr. Montessori was invited to organize. Needless to say, she accepted the commission gladly. The first "Children's House" was opened in the Quarter of San Lorenzo, in January, 1907. A second followed shortly in the same Quarter, and then a third in a better-class district of Rome. But after working in these daily for two years, and succeeding in evolving her "method" for little children, Dr. Montessori unfortunately had little more influence in these buildings. Schools using her methods, however, soon sprang up under many different authorities in Rome and in other parts of Italy, and in the seven years which have passed since their commencement, Dr. Montessori has been able to verify and perfect her methods under many diverse conditions, both for rich children and for poor.

The schools which thus came into existence were shortly to become world famous. Some articles describing them appeared in *McClure's Magazine,* which attracted widespread interest. These were followed by others, and shortly afterwards by a book by Dr. Montessori herself, translated into English from the original Italian. This book, under the title *The Montessori Method,* was highly successful; easily the most popular work on education of late years, it rapidly achieved a circulation such as few books in any sphere have recently enjoyed. In England it was also widely read, and translations before long appeared in all the principal European languages, and also in Chinese and Japanese.

The new principles advocated naturally aroused much discussion in the educational world, and in a short time a considerable bibliography dealing with the method sprang up. Numbers of Montessori schools have been started in the United States of America, many also in England, and others in France, Germany and Switzerland; the latter country has transformed into Montessori schools its orphan asylums and infant schools in certain cantons.

The "School Within the Home." Before proceeding to a description of Dr. Montessori's methods, a word may be said about a characteristic feature of her first schools, namely, that they were situated in the same building as the homes of the children. Under such conditions the children do not have to "go out" to school, and the feeling of strangeness and separation from home is avoided. The child when he eventually goes to the state school already knows what school is. In addition to this, the mother working at home is constantly near her little ones; from the window she can see her child playing in the garden, or be ready to run to his assistance at the sound of his cry. This greatly adds to the child's contentment at school, and forms a valuable condition of a school environment for children of this age.

A greater advantage, however, is a social one, the effect which the school has upon the adult members of the community in which it is situated. In the reformed tenements, in which a higher standard of life had been made possible, this was little short of miraculous.

The neighborhood in which Dr. Montessori began her work was one, perhaps, hardly to be equaled elsewhere in the world in poverty and wretchedness, with their inevitable accompaniment of crime and vice. In the overcrowded houses, families lived in conditions of appalling depravity and squalor, several families sometimes occupying the same room, sleeping crowded together with little light or ventilation, and the children often witnessing disgusting scenes of violence and sensuality.

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The school, amid such a people, was able to have an uplifting influence, setting an example of cleanliness and order, and coming, in its pleasant atmosphere of happiness and peaceful occupation, like a ray of sunshine through the dark clouds of squalor and oppression which overshadowed their lives.

Perhaps, in a moment of depression, you have once chanced upon one of those quiet retreats; some monastery or nunnery, in which the inmates seem to live undisturbed by the bustle and turmoil of the world about them, and go about their duties with serene, cheerful faces, loving one another, and extending kind hospitality and confidence to the stranger who may visit them. If so, you will have felt a kind of reinvigoration, like a draught of clear water to one who is thirsty. It is a glimpse of another life wherein the needs of the spirit seem to find promise of satisfaction. And one leaves with a sense of encouragement, almost with an ideal, which remains as a warm remembrance in the heart, and as a help and uplifting influence in life.

Similar to this is the effect of these "Children's Houses" among the homes of the poor. Here is a room in which there is peace; all is orderly, clean and pleasing to the eye. Its inmates move about with clear, happy faces, and eyes which express an inner joy. No harsh word is heard, but only the hum of contented activity, the voices of little beings busily employed. Occasionally music bursts forth, a simple march or song, a pretty tune, which the teacher plays for the children to listen to. Then, if there is a garden, the children have here planted shrubs and flowers, and made a nature beauty spot in the midst of slumland.

A little community has sprung up, creating its own atmosphere of happiness and contentment, and representing the attainment of higher possibilities of human life. Little wonder that the "Children's House" became a source of inspiration in the tenement. Parents, who before seemed too low for any hope of redemption, began to send their children to school well dressed and washed. The children themselves, in fact, were unhappy, or refused to come unless they did so, thus bringing the message of the school into the homes and lives of the parents. Flowers began to appear on window sills; and the walls of staircases and corridors and the cleanliness of yards began to be respected.

The presence of the school, in fact, seemed to act as a balm of healing, forming a center of new ideas, and of inspiration and encouragement; for children, undoubtedly, have an entry to the heart which is closed to other appeals, uplifting the life about them, like real redeemers from a better land.

The teacher, also, has a great opportunity for social work. Owing to the reformed building, she is able to live near her school in the same tenement as the children's parents; and in this position she is able to become intimately acquainted with them. Through a winning and cultured personality she is able to gain their confidence and find countless opportunities of giving advice, and of helping to raise and purify the lives about her.

The "Children's House"

An ideal "Children's House," as Dr. Montessori conceives it, would consist, not of one room only, but of several communicating with one another, and it would also have a garden. The rooms should include a gymnasium, a dining room and a little parlor, or common room, in which the children can rest or play when not at work in the large working room. Such ideal premises, however, are not essential to the practice of the method, and excellent results have been obtained in a single large room, even without a garden.

The rooms should be prettily furnished and decorated, and made as homelike as possible. An important feature of the furnishings of the "House" is that they are all of dimensions suited to the children. The chairs and tables are low, as also are the cupboards, pegs, basins, the blackboards hung upon the walls, and all the other articles which the children use.

The children also have *charge* of their house. They have to keep it clean and in order, wait upon themselves, and do all the practical operations connected with their life. They lay the tables for meals, wait upon one another at table, wash up, sweep the floor, wash the chairs and tables, brush the carpets and little mats which they use, clean their own shoes, and so on. The "Children's House," in fact, is really what its name implies, a house made for children, of which they are the masters.

Dr. Montessori also insists that the objects which the children use shall be fragile, that is, not of the unbreakable pattern which it is common to give children to-day. The drinking tumblers are made of glass, the plates of china,

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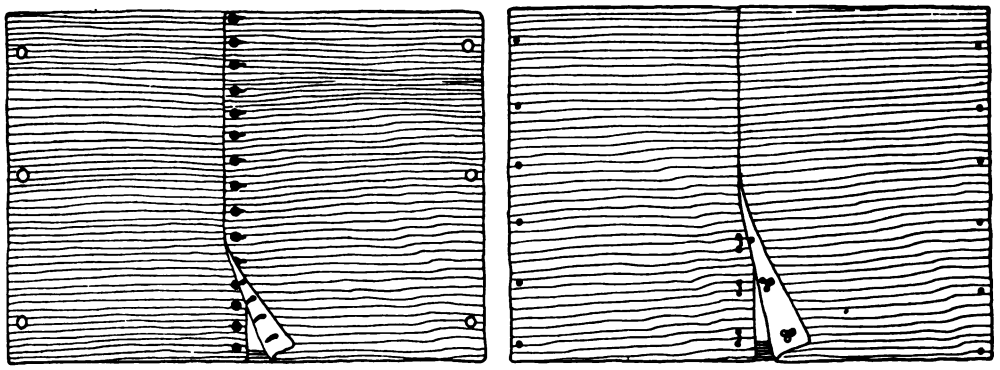
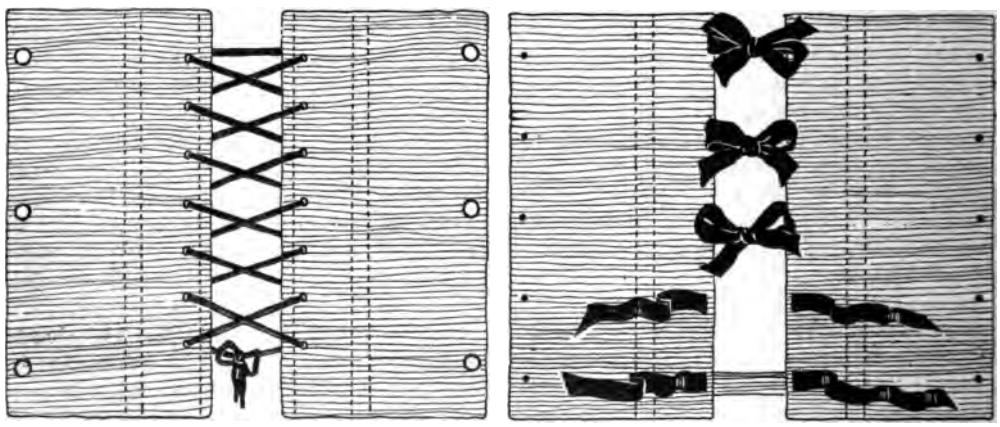


FRAMES FOR EXERCISES WITH BUTTONHOOKS AND HOOKS AND EYES

The chairs and tables are light, so that they move and make a noise if the children knock against them. An environment of this kind is *sensitive* to the child's mistaken movements. The child who moves badly and causes a chair to grate upon the floor is denounced by the resulting noise. The glasses and plates which he carries are breakable. Erroneous movements are thus revealed to him, and he tends to correct them and perfect his muscular control. If, instead, the chairs and tables are heavy, or fixed to the ground, and the utensils which he uses are unbreakable, the child may make many mistaken or clumsy movements without being aware of them, and may then form habits difficult to break later.

These activities of the children, in fact, have not only a practical value, but also an educational one, since through them the child gains control of his muscles. The coördination of the movements forms one of the principal parts of the child's physiological development at this age; and to provide opportunity for intelligent and purposeful activity is therefore to respond to a vital need of his life. In the "Children's House," the grace and deftness of the children's movements are clearly marked. The ease and certainty with which a child will carry a glass of water, or a little toddler of four carry around a tureen of hot soup to his companions at lunch, forms a striking contrast to the usual helplessness of children of this age. Instead of being prevented from moving, and made to sit still, in order to obtain order and quietness in the room, the children learn to move without creating disorder.

The Frames. Another of the operations of practical life which the children learn to do for themselves is that of dressing and undressing. To assist them in acquiring this accomplishment, Dr. Montessori has designed a series of light wooden rectangular frames, to two opposite sides of which are attached pieces of cloth or leather, as the case may be, which can be fastened together down the middle of the frame by means of buttons, hooks and eyes, bows, lacing, etc.; in fact, by all the different modes of fastening of which man makes use.



FRAMES FOR EXERCISES IN LACING AND TYING

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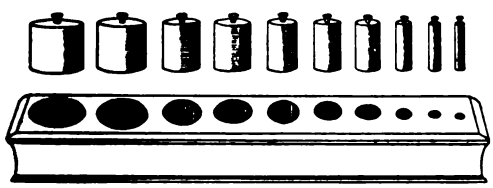
The child can seat himself comfortably with one of these before him at a table, and practice the given operation at leisure. Each of the processes, such as buttoning, lacing, tying bows, etc., represents problems to the child at first; problems, not only to his mind, but also to his fingers, which have not yet learned to make the necessary movements. Practicing them separately, therefore, isolated from the other difficulties with which they are combined in dressing, enables him to acquire skill in these movements much more quickly than if he only encounters the exercise in practical life.

Dr. Montessori lays stress upon the exercises of practical life from still another point of view, namely, that they lead the child to become independent of the help of others. This is an addition to his liberty. "In reality, he who is served is limited in his independence." This concept will be the foundation of the dignity of the man of the future—"I do not wish to be served *because* I am not an impotent." And this idea must be gained before men can feel themselves really free.

The Education of the Senses. In Dr. Montessori's method considerable importance is attached to the education of the senses. During the period of growth in which they are in process of development, exercises which contribute to the education of the senses are spontaneously attractive to the children, and they repeat them with evident interest and pleasure for long intervals of time. This is also the period in which a systematic training of the senses is most effective.

The apparatus used in the education of the senses is too extensive to be here described in detail, but the following examples will illustrate its nature and principles:

(a) *The Cylinders.* These, which may be given to the youngest children, consist of a series of ten wooden cylinders which fit pre-



FOR EXERCISES WITH WEIGHTS OR CYLINDERS

cisely into a row of holes in a block of wood They vary gradually in dimension, from the largest at one end to the smallest at the other. The child plays with these, taking them out of their holes, mixing them upon the table, and then striving to replace them. The exercise is one in visual perception, requiring the child to perceive similarities and differences of form. For children of two and a half to three years of age this game has great fascination, and they repeat the exercise, taking out the cylinders and replacing them an indefinite number of times.

There are three blocks of cylinders; in one of these the cylinders vary in diameter only, in another in height only, and in the third, in both dimensions.

(b) *The "Long Stair," the "Broad Stair" and the "Tower."* These consist (1) of a series of ten rods, differing from one another in length

THE "LONG STAIR"

by ten centimeters at a time, and forming a gradation from a rod of ten centimeters to a rod one meter in length; (2) of a series of ten square prisms, differing in the side of their cross section by one centimeter at a time, from a prism measuring one square centimeter in cross section, to one having a cross section ten centimeters square; the game with these consists in arranging the rods or prisms upon the floor or table, in order of gradation; (3) a series of ten cubes varying in size from a cube having an edge of one centimeter to one with an edge of ten centimeters. These are built one upon another in order of size, commencing with the largest at the bottom.

(c) *The geometric insets.* To train the eye in the perception of *form,* an apparatus is used consisting of flat geometric figures, cut out of wood, and fitting into corresponding holes in flat wooden squares, or "frames." A selection from a large number of these, comprising circles of different sizes, squares, rectangles, triangles and polygons, may be presented to the child, who has to take out the figures, mix them and replace them in their corresponding apertures. To this exercise, which is one of vision, may be added an exercise of the muscular sense, the child passing the tips of his first two fingers around the contours of the figures and of the frames. It is often seen that a child who finds difficulty in replacing the figures by means of his sight alone, does so easily, having "touched" them. (See illustration, page 3921, and panel at head of this article.)

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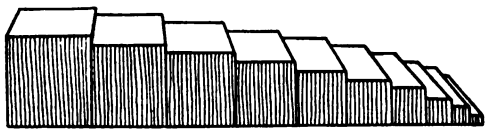
(d) *The Colors.* These consist of flat wooden spools, upon which are wound colored silks. There are sixty-four colors in all, composed of eight series, or gradations. Each gradation con-

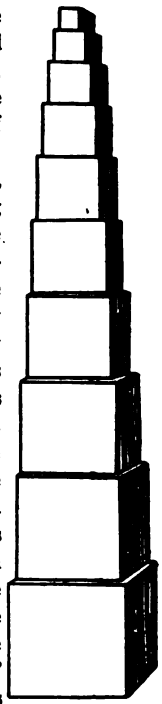


THE "BROAD STAIR"

tains eight spools of the same color, but varying in intensity from light to dark. A double set of these colors is provided.

In the simplest exercise with these, the child is presented with two or more pairs of similar colors; for instance, two blues of the same shade, two reds, two yellows, etc. The game consists in mixing these upon the table, then finding the corresponding pairs and arranging them in couples. A more difficult exercise is that of arranging a series in order of gradation. To this may then be added a second series, then a third, and so on, till the child is able to sort a confused heap of the whole sixty-four colors into a beautiful shaded "mat" upon his table.

Other sense exercises include those for touch—rough and smooth surfaces, stuffs, etc.; little wooden tablets for the baric sense, or perception of weight; sound boxes and bells; beans, counters, Froebel cubes, or other objects for educating the stereognostic sense, or the muscular and tactile sense combined, by which we perceive the nature and form of bodies by handling them. During many of these exercises the children's eyes are blindfolded. This adds to their interest, and also fulfils a technical condition in sense training, namely, that the sense to be educated shall be isolated. Unless this is done, the child is likely to depend too much upon one sense—most frequently the sense of sight—and to sacrifice the fine development of the sense of touch. The "silence" game described below illustrates the same point.



THE "TOWER"

Sense Education

The importance to the individual of sense education is too large a subject to be here dealt with, but its value may be readily appreciated if it be considered that in the generally-accepted view of modern science, the whole of man's conscious life is built upon the impressions which he receives from the external world by means of the senses. Some other aspects of the question, however, may be profitably touched upon. The fact, for instance, of the child's spontaneous use of this material is a deeply interesting one. It is evidently something more to him than a game, since it would also be this to a much older child; while it is only children of a certain age who interest themselves in the exercises for any length of time. Such children, however, are seen to repeat the same exercises an indefinite number of times, taking out and replacing the cylinders, for instance, ten, twenty, or thirty times in succession, and this on many consecutive days, sometimes for several weeks.

Similarly, the exercises with the colors, the cubes, and so on, are continual sources of interest, and children repeat them spontaneously for long intervals of time, returning to the game repeatedly during many weeks and months. These exercises, in fact, appeal to the child during that period of his development in which the senses themselves are in process of formation. It is because they correspond to and help this physiological process, that the child delights in them, and finds in them a deep attraction, which is truly a vital manifestation of his life. Perhaps Henri Bergson expresses a great truth, of which we here find an example. In an essay entitled *Life and Consciousness,* he says, "Philosophers have not sufficiently remarked that Nature has taken pains to give us notice every time her destiny is accomplished; . . . she has set up a sign which apprizes us every time our activity is in full expansion: this sign is joy . . . we find that wherever joy is, creation has been, and that the richer the creation the deeper the joy."

The work of the children in the "Children's House," in fact, may almost be said to be *characterized* by expressions of joy. The children work happily and contentedly, an occasional cry of delight bursting from one of them who has succeeded in some new accomplishment, to attract the attention of the teacher,

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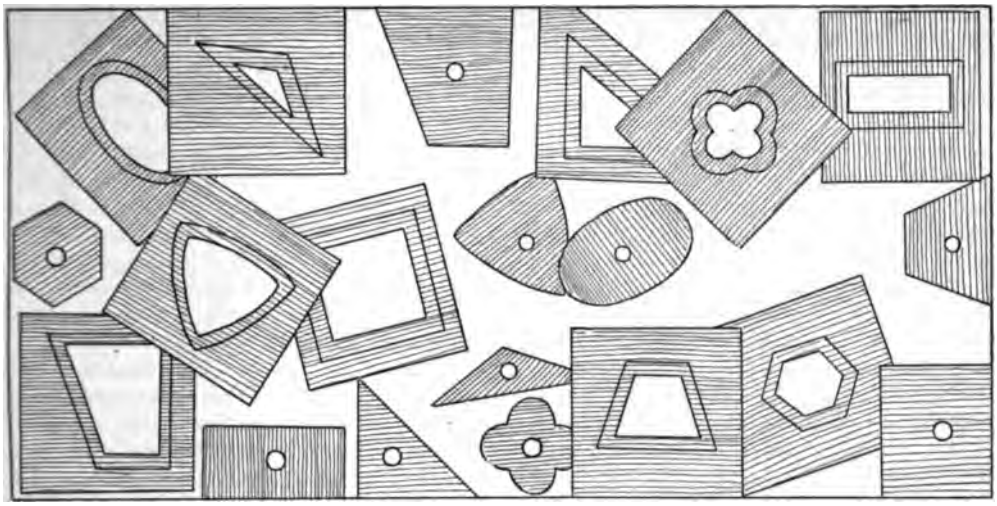

EXERCISES IN GEOMETRIC INSETS

or to call his companions to come and admire. It is a joy which they feel in their own self-development, and which gives a characteristic expression of calm and brightness to their faces; for their life is one of continual expansion, and of joyous unfolding and exercise of their increasing powers.

It may be objected, "But would not the senses also develop without special apparatus by practical use in the environment?" Assuredly, but not with the same facility, or to the same degree of refinement. Above all, not with the same *certainty*. If the child's surroundings, for instance, be lacking in color, as is so often the case in our drab cities of dull gray and limited sunlight, his color sense will be deprived of the stimuli which it needs for its development. For the refinement of a sense, too, it is necessary that it have practice in making fine discriminations. The child, for instance, who distinguishes between two cylinders differing very slightly in size, performs an exercise in visual discrimination with which he would rarely meet in his ordinary surroundings. The child wishes to touch and handle objects, and goes in search of experiences of this kind, but if his environment is unsuitable, or he is impeded by adults, he is unable to satisfy this need. In fact, it is often rebellion against this unconscious suppression of their expanding life which accounts in great part for the so-called "naughtiness" of children of this age.

The apparatus therefore provides the children with an organized and orderly means of finding those experiences in handling objects and refining their senses, of which they have need. The child who has the advantage of it might be compared to the student at a university, who finds there all the material for his study already collected and arranged for his assimilation; contrast such a one with the student who undertakes research in a new field, and must search for his material among the ancient records and in the books of scattered libraries. The provision of the apparatus renders the path of the child's development direct, instead of haphazard and tortuous. And in this way much time and vital energy is conserved, reinvigorating the child's life, and animating his activities in further conquests. "Prepare ye the way of the Lord, and make his paths straight."

Relation of Senses to Environment. Another important aspect of this material for training the senses is the relation which it bears to the child's external environment. It will be noted that it represents in a concrete and isolated form the various qualities of color, dimension, shape, and so on, of the objects which surround the child in his environment. The colors, for instance, which figure in his surroundings in every imaginable combination with qualities of texture, form, dimension and the like, are each represented in the color tablets, in isolation from others, and confined to a single object of which they are the one characteristic. Forms are separated in the same way. The shapes which surround the child everywhere—the rectangle of the door, the circle of his plate, the ellipse of the table—are all represented in his geometric insets. Similarly other qualities, such as high and low, long and short, thick and thin,

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are exemplified in the cylinders, the rods and the prisms. Rough and smooth, light and heavy, loud and soft, are all experiences encountered in his use of the apparatus.

The apparatus therefore represents an analysis of the environment, and the child's use of it serves in a sense as an explanation, or kind of "introduction" to it, unconsciously establishing an order of clear ideas in his mind, which leads to his observation of his surroundings in an orderly and intelligent way. As the child, in fact, distinguishes the different sense impressions in his exercises, the teacher fixes the new idea in each case with a word, teaching him the names of the qualities he has perceived. For instance, choosing an opportune moment, she takes two of the color spools with which the child has become familiar in the exercise of pairing the colors, say a red and a blue one, and laying them before the child, she holds them up, attracting his attention to them in turn, and saying simply, "This is blue," "This is red." She emphasizes the words *red* or *blue*, or repeats them, to fix them well in the child's mind. After a pause, wishing to test if he has understood, she says, "Give me the red," "Give me the blue," and if the child responds correctly, she proceeds to the third period of the lesson, asking "What is this?" "Blue." "And this?" "Red."

The three periods we have described are characteristic of the lessons given in a Montessori school, and a similar proceeding is followed in all the cases of lessons in nomenclature. They originated with Seguin.

In this way the child learns a large number of general names in their precise meaning, referring to the qualities of objects in his environment; large, small; high, low; light, dark; round, square, oblong; rough, smooth; and so on. Generalization, however, or the recognition of these in his surroundings, is a further step, and with normal children generally comes spontaneously. Some children will immediately pass from the particular to the general. For instance, having done the exercise in feeling the qualities of different stuffs, they will at once seek similar experiences about them. A visitor, in fact, is often surprised by the approach of a child who lightly takes hold of the stuff of her dress, feeling it between his fingers with evident pleasure. Other children will not generalize at once, but in general the teacher awaits the spontaneous appearance of this phenomenon. A child, for instance, will suddenly become aware of one of these applications in his environment. The sky is blue; the window is a rectangle; and these little discoveries come as a surprise to him. He feels a joy akin to that of real discoverers, and this prompts him to further observation of his surroundings. The children with senses already educated become spontaneous observers, and the discoveries which they make fill them with enthusiasm. A child was once seen gazing for a long time at the new moon. He was then heard to remark, "It is part of a circle. No. It is part of an ellipse!" The observations which they make come in the nature of recognitions, entering the mind like old friends, instead of unknown strangers; and they take their place in a classification already existing, each under its appropriate name. The children thus observe with order instead of chaotically, and an important foundation is therefore laid in the orderly construction of their mental processes.

The Lesson of Silence. A game in which the children take much delight, and which, from many points of view, plays an important part in their education, is the "Lesson of Silence." Choosing an opportune moment in the day, the teacher invites them to remain perfectly still, establishing a profound silence in the room. The room is then darkened, or the children close their eyes, and the teacher, going into a far corner, or perhaps into an adjoining room, calls the children, one by one, by name, in a hardly audible whisper. The child whose name is called has to rise quietly and make his way, with the least possible noise, to the voice which has called him. Little by little a small group of children forms round the teacher. These stand silently watching their motionless companions, who, one by one, "awaken," open their eyes, and trip softly towards the little group in response to the light whisper of the teacher's voice.

When the silence is established, many noises, before inaudible, become apparent; the rustling of the trees in the garden, the hum of a bee, the ticking of the clock; and these fascinate the children, causing them to deepen and perfect the silence. The children, in fact, take a deep joy in this experience, which is like a restful retreat from the habitual noises which surround them.

To listen to these almost imperceptible sounds and await with keen attention the hardly audible whisper of the teacher's voice, is an exercise of the hearing which plays a valuable part in the education of this sense. The efforts for self-control needed to maintain the silence are also of the greatest value. The children have

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to restrain impulses to move, and they sometimes succeed in this in spite of the strongest stimuli. A child, for instance, is seen to repress a sneeze, or refrain from brushing a fly from his face.

The children feel the action of a collectivity in this game. The child, with his eyes closed, hears the sound of another's movement, and it is brought home to him in the most striking way that the silence depends upon the coöperation of *all* the children, causing him to increase his own efforts to remain motionless.

The children who have learned to enjoy the pleasures of silence become sensitive to harsh and unpleasant noises; and also, during the hours of work, try to prevent these, moving carefully to avoid knocking against the furniture, and thus adding to the grace of their movements. The repetition of the "Lesson of Silence," in fact, is found to have a marked influence upon the "discipline" of the children in the "Children's House." The mother of several children might well find a similar exercise helpful occasionally in the home.

Writing and Reading

In the teaching of writing and reading, Dr. Montessori perhaps achieves one of the most striking successes of her method. The children, in this method, *prepare* themselves for writing without actually writing. The different processes involved in writing are analyzed and prepared *separately*, leading concurrently to a certain maturity, when the child is able to write whole words or even sentences, although writing for the first time. This comes about without effort, and is rather a source of pleasure, and, when they finally write, of intense fascination to the children.

During the period of sense training and exercises in practical life, the children do an exercise which consists in filling in outline designs with colored chalk. These they draw on paper with the help of metal insets (similar to the geometric insets of wood), which they use as stencils. They then fill in the figure drawn with light, parallel lines. The exercise is followed by more difficult ones, requiring the use of printed designs of gradually-increasing complication. This exercise, which is very fascinating to the children, enables them to gain control of the pencil, and therefore forms a fundamental part of the preparation for writing.

Writing, however, involves another and more particular process, which consists in tracing the forms of the letters. Preparation for this is given by means of the "sandpaper letters," which consist of large letters of the alphabet (script) cut out in sandpaper and gummed on to smooth cards. The object of these is to enable the child to pass his finger tips lightly over the letters in the sense of writing; his movements are guided by the sandpaper, which furnishes a contrast with the smooth surface of the card. The teacher presents the cards to the child, two at a time, teaching him the phonetic sounds which they represent. At the same time she has the child "touch" the letters with the tips of the first two fingers of his right hand, directing him to pass them over the letter in the sense of writing. Children who have followed the method up to this point have already done exercises in touching rough and smooth surfaces, and in passing their fingers around the contours of geometric figures. The exercise, therefore, presents no new difficulties to them, and is found to prove an attractive one, which they repeat with pleasure. Children from four to five years of age take especial delight in this exercise, after which period it is unusual to find in them the same persistency. It is the repetition of the "touching," in fact, which has importance, fixing the form of the letter not only in the child's visual memory, but also in his muscular memory, and coördinating the movements made in tracing it.

Having thus learned the sounds of the letters, the child begins to compose words with the "movable alphabet." This consists of letters of the alphabet cut out of thin cardboard, and kept in two cardboard boxes containing many copies of the same letter. The teacher pronounces some word slowly and distinctly, and the child, whose ear has already been educated, is able—by repeating it continually to himself—to analyze its sounds and pick the corresponding letters out of the box. These he arranges in order upon his table or mat upon the floor, performing an operation similar to that of a compositor. The children ask the teacher to suggest other words, or they themselves think of words to write, or are given them by their companions.

The child who has thus learned to compose words and sentences, and has at the same time prepared his hand in the processes involved in writing, arrives one day at the point of being able to write; and this comes as a great and

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joyous discovery for him. In a tolerably clear hand he will trace whole words or sentences, although this is the first time he is holding an instrument in his hand for the purpose of writing. And from that time on he proceeds with passionate delight to increase and perfect his new acquisition.

The beginning of reading, in contrast with other methods, comes, not before writing, but contemporaneously with it, since the child is naturally able to read the words which he has composed. But the reading of words not previously written is a further step, and is practiced by giving the children slips of paper upon which are written words, or, at a more advanced stage, sentences, describing actions which they must carry out. Of course care must be taken to use only familiar words.

Number Work

The child's first ideas of number are given by means of an apparatus with which he is already familiar; namely, the rods, or "long stair." These he has already learned to place in order of length. The rods, of which there are ten, vary in length by intervals of one decimeter, from one meter to a decimeter. The decimeter lengths composing them are painted red and blue alternately. The shortest rod thus consists of one decimeter length, the next of two such divisions (painted red and blue), the next of three, and so on. With these the child learns the numbers up to ten, being taught them, as with the letters, by the three periods of Seguin.

The teacher then introduces the child to the numerals, which are cut out in sandpaper and gummed upon smooth cards, in the same way as the letters. In connecting these with the names of the numbers which they represent, she has him "touch" them, thus preparing him simultaneously to write them; and also associates them with the rods to which they correspond, showing him how to place each numeral against its appropriate rod.

The child then constructs the "long stair," placing the cards in order against the successive "steps."

This game is followed by another in which little sticks, or pegs, are placed in a row of numbered compartments. There are ten compartments labeled from 0 to 9, and the child must place the correct number of sticks in each compartment. This game teaches the meaning of the zero, since *nothing* has to be placed in the compartment labeled 0.

Addition and subtraction may also be begun with the rods, the child placing the 1 end to end with the 9, and writing $1 + 9 = 10$. He then adds the two to the eight and writes $8 + 2 = 10$. Then $7 + 3 = 10$, and so on. The reverse process naturally constitutes subtraction. On reaching the five, he may be shown that in *turning it over* it makes up the ten; and the child writes $5 \times 2 = 10$. Extensions and variations of such processes suggest themselves.

For counting up to 100, two cards are provided on which are printed in a column these figures. By covering the 0 with cards bearing the numerals, the child can compose 11, 12, 13, etc., and similarly 21, 22, and so on, up to 99. Arrived at this, the children themselves ask, "But what comes after 99?" and the teacher then teaches them the 100.

10
20
30
40
..
..
up to 90

Musical Education

An important exercise which greatly helps the children in gaining equilibrium and grace in walking consists in marching upon a narrow line painted upon the floor. They do this first as a simple exercise in balancing, but it is later combined with music, a simple march being played to accompany them. At first, however, the children make no effort to march in time to the music. This shows lack of *perception* of the rhythm, and the teacher makes no attempt, by clapping her hands or other means, to have the children do so. It is an education of ear which is needed. Instead, she continually *repeats* the same tune; the children one day of themselves become aware of the rhythm and begin to march in time. To move in time to a rhythm which is felt is a primordial instinct, and this point attained, other tunes may be added. The children, in fact, are shortly able to change their action, running, walking softly, or galloping in accordance with changes of the music, without a word at any stage from the teacher. They often accompany their marching with little songs, clap their hands, or beat toy tambourines, etc., in time to the music. The teacher may then also introduce dancing,

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showing the children some simple steps which may gradually be made more elaborate.

The older children take interest in a double series of bells, mounted upon wooden stands. These are all similar in appearance, but on being struck, emit the notes of the musical scale. One series is placed in order upon a board, and the others stood in a mixed group upon the table. The child strikes the first bell, "do," of the fixed series, and then searches for its match in the mixed group, striking the bells upon the table in turn. On finding the similar note, he places it opposite the first bell struck upon the board. He then proceeds to the next, finding its pair and placing it opposite its fellow, and so on, until every tone in the scale has been matched up.

This is primarily a sensory exercise, but it leads naturally to learning the names of the notes, and associating these with the signs of written music. The latter are introduced by means of wooden boards bearing the staff painted in black, upon which a child places disks bearing the names of the notes; this is done (a) with mechanical control, and (b) by memory. These boards also serve for teaching the treble and bass cleff, and for "composing" simple musical phrases. The child, having placed disks upon them representing the air of one of the tunes to which he is accustomed in his marching, may then be led to mark the bars, laying little sticks across the staff; in his marching he has already learned to perceive the *beat* of each bar.

Liberty and Discipline

The processes which have been described, by which the children "educate themselves," may be considered the crux of the Montessori method. It is the obtaining of auto-education which renders the liberty of the child a practical possibility in the school, and it is to this that may be ascribed Dr. Montessori's success where other attempts have failed.

In fact, the discipline in these schools is one of the most striking results of the method. A visitor entering the room will be struck by the harmonious and ordered activity of the children. Here a child is wrestling with an obstinate button on one of the frames for buttoning, another is composing words with the movable alphabet upon a prettily-tinted carpet upon the floor. Another is building the "tower," while others are writing upon large slates, or upon the blackboards hung upon the walls. Children pass lightly to and fro, fetching from the cupboards what material they need, or returning it after use; exchanging remarks with their companions or stopping to admire another's work. The whole atmosphere, in fact, is one of busy and contented activity, each child happily concentrated on the work in hand. Little notice is taken of the teacher, who moves softly from one child to another, giving here a simple demonstration, there a lesson or word of encouragement, or joining enthusiastically in the joy of a child who has made a discovery or succeeded in performing some new feat by himself. The children's activity does not emanate from the teacher, but is the spontaneous self-activity of the children themselves, having origin in the sources of their life. Before this, the teacher is a humble and retiring observer, seeking to help and serve, rather than shape or evoke, the phenomena of life which unfold.

Evidently the idea of discipline which we must hold in regard to a school of this type is very different from that inherent in the old school, in which discipline meant immobility and obedience to the commands of a teacher. In a school in which the children are free, discipline takes on a significance in relation to their *activity*. It is on this, in fact, that the harmonious collective life of the members of the little community rests. An undisciplined child is one whose actions disturb this harmony, or who acts contrary to the generally-accepted standard of good breeding. He is not one who moves, but one who moves improperly. Such actions must be checked by the teacher, and little by little eliminated. But every other manifestation, every action having a good or useful purpose, must not only be permitted, but observed by her.

Such discipline more closely resembles that of adult civilized society, in which liberty is certainly not synonymous with lawlessness and license. Throughout nature, harmony is the result of implicit obedience to law, and the liberty of man does not lie in a license which is antagonistic to life, but in freedom to develop in accordance with the laws which govern his life, and permit of its infinite expansion.

The discipline of the school becomes more nearly perfect with time. Often the first days are ones of great disorder. But, little by little, as the children's interest in work increases, this

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confusion gives way to an atmosphere of calm and a self-ordered activity which continually approach perfection, and a spirit of harmony, of mutual interest and of unselfishness gradually arises among the children.

This result can never be brought about by the external commands of a teacher, but is an inner development on the part of the children. Indeed, it seems that just as in adult society, where obedience to law is the rule, and delinquents are nearly all drawn from the diseased or less-favored portions of the community, so the discipline of the child is a natural characteristic of the normal and well-grown personality.

Scientific Aspects. The educational method described will be seen to have its origin in a very different conception of the function of education, and to exert a very different effect upon the individual from that of the former pedagogy. In this method it is the inherent forces of growth and development present in the individual which are the central points of attention. It is to help and nourish these forces, providing them with the stimulus which they need, and leaving them free in their development, that is the central aim. All the particulars of the method revolve about this. The child is no longer looked upon as passive material in the hands of the educator. The old methods spoke of "developing character," "awakening interest," "inculcating the moral sentiments," and the like; the child's mentality was transported indiscriminately, now to mathematics, now to nature study, now to design, as though it were something inert, having no natural activities of its own. These were efforts characteristic of the old education—the determination to mold and fashion the growing individual according to the will of the educator.

In the new method the individual is regarded as a being who contains in himself the forces needed for his development, and who must himself evolve according to his own laws. The function of education is to study and observe these, seeking to correspond to their needs, tenderly nursing, so to speak, the growing life, providing it with the means of growth, the psychic stimuli which it needs, and waiting and observing. In determining the action of pedagogy, so understood, Dr. Montessori considers that the help of science is needed. It is science which must study the growing life, determining its needs and the help which may be given it, just as science determines the action of the modern gardener, defining the conditions of soil and temperature which he must supply, his intervention, etc.; but he must also wait for the plant to appear, since it is life, and not the scientific conditions, which brings it into being.

Hygiene has already done this work for the physical life, but science must extend its action, Dr. Montessori declares, to the psychic life. It is a contribution, in fact, of this kind, which she considers to be made by her method. It is science which has established the means of education herein used, proceeding by objective study and by experiment to determine the means and action of education in its nurture of the growing life, which leads to its unfolding in the fullest and most perfect way. This is the function of education—to secure the generous unfolding of life; to follow it in its development according to its own laws, seeking to correspond to its requirements, in order to insure the fulfilment of its inherent powers.

The freeing of the child's spirit must be the first condition of such pedagogical action; and for this reason the continual class instruction of the teacher can no longer have place. The practical solution, in fact, of the problem of liberty in the school lies in the didactic apparatus, which enables each child to expand his own energies, finding the outlet which he needs for his muscular and mental activities.

The activity of the teacher must be to put the child into communication with this material, setting him upon the path of his development, but then retiring before his spontaneous self-activity for which she can do nothing. Her aim is to follow this life which unfolds, providing it with its needs, giving the stimulus which starts a spontaneous work of expansion; but she must also know when to retire, to perceive the moment in which her interference will hinder; to wait and to observe. She must have infinite faith to await the gifts of life; they will come. And this faith increases with experience. She will also know that any action which can help this unfolding must of necessity be limited. Hers to give the touch, the light cast upon the path; Life's to unfold the great miracle of human activity and expansion.

The intervention of the teacher, in fact, is limited by science. It is found from experiment that too much interference on her part hinders the child in his development, while too little likewise retards it. Within limits, therefore, her activity may be exactly defined. The

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words of the lessons, for instance, are precisely determined, the reactions of the children which she must respect are already known. But this can never render her work mechanical. Each case will have different needs; and her action must rather be guided by a fine intuition and delicate sensibility, which raise it to the level of an art. She is the skilled and watchful attendant upon Life, serving it devotedly in its entry into the world. And the refinement of her sensibility in observation and interpretation of the child, which forms part of the perfection of her moral beauty, raises her in dignity to that of priestess of humanity, enabling her to lay priceless gifts upon the altar of the new generations.

The didactic apparatus also owes its origin to scientific study and experiment. It corresponds to facts of the child's nature, and, as with all natural facts, it is positive science which puts us in touch with them. The articles composing it must correspond in *nature* to the child's innate needs and tendencies, and they must also be attractive to him in *form*. The Montessori didactic apparatus represents a selection from a vast number of experiments, objects having been retained or rejected, and modifications made according to the activity of the child in regard to them. The phenomenon of fundamental importance is a profound interest and concentration of attention on the part of the child towards one of these articles. This first arrested Dr. Montessori's attention in the case of the cylinders during her first experiments with normal children—a child, with fixed attention, repeating the exercise an innumerable number of times. By repeated trials, she was able, little by little, to extend this phenomenon to all the other objects of her apparatus, every detail of form, dimension and color being determined in reference to this criterion. Seguin had invented material by which the education of deficients was *possible*. Montessori, coming later, found that many of the same devices, in identical, or modified form, led to *auto-education* when placed in the hands of normal children.

The apparatus is an *aid* to the child in his development, and may be considered, along with the help of the teacher, and the other provisions of his environment, as constituting the *psychic* nourishment of his growing life.

An important characteristic which experience must consider in regard to this apparatus is its quantity. At first sight it would appear that to multiply it indefinitely would be the best means of serving the child; but in reality a limited quantity is found to give the best results. The apparatus must be *sufficient* for its purpose, but not excessive. The child's development is not in exact correspondence with his exercise with the apparatus, but consists also in a spontaneous work of generalization and of abstraction. The child, for instance, generalizes from the apparatus for sense training to his environment. But experience shows that too great a quantity of material retards this spontaneous generalization, the child remaining torpidly fixed upon the material objects. Similarly a smaller quantity of apparatus is insufficient to lead the child to this point; we see this exemplified in the difficulty which the teacher in the common schools experiences in leading the children to make this generalization.

The same holds true for the apparatus for number. At a certain stage the child abstracts, making arithmetical calculations in his head instead of using the material objects. Too great a multiplication of these, however, distracts his attention from this progress, and he forgets the spontaneous abstraction which was born in him.

The child passes from the frames to dressing in reality; and from touching the sandpaper letters to the infinite applications of writing. Thus the apparatus is not an end, but a means, whose function is to bring about an infinite activity and expansion. Its purpose is to produce this as quickly and as completely as possible, and one of the conditions which it must fulfil to this end is its limitation.

Observing the Child. A method of education which seeks to leave the child free, corresponding to his needs, permits also of his observation from a new point of view. His real nature is revealed to us, in which science may disclose absolute laws. Dr. Montessori, in fact, rather than claiming to have established a new method of education, claims to have established the method for a new science; since the child may be scientifically observed under conditions of freedom in which he is able to attain the normal fulfilment of his life.

This is essential to the construction of a true infant psychology. Just as infant physiology was really known only after the positive sciences had revealed the laws of hygiene, and sprang up as a positive science almost side by side with hygiene itself, so infant psychology will be known only when we can make positive studies of the child under conditions for the

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psychic development similar to those of hygiene for the physical. Psychology and pedagogy thus go together in the "Children's House;" their methods are identical. From one point of view the methods employed are educational, from another they furnish the conditions required for scientific research. The *school* thus becomes the field of experimental psychology, and the teacher a scientific observer.

In conclusion we may cite the observations and records which it is the duty of the teacher to make. A biographical chart is constructed for each child, recording the more important facts of his physical and psychological development. Psychological observations, of course, are of a synthetic nature; that is, they have reference to manifestations of the child's personality as a whole, and this gives rise to a classification of psychological characteristics fundamentally different from that of the modern experimental laboratory, in which the trend of investigation is analytical rather than synthetic. The guide with which Dr. Montessori supplies the teacher for her psychological observations is as follows:

Guide for the Psychological Observations

WORK

Note when the child begins to remain constantly at work.

What work and how long he persists in it (slowness in bringing it to an end, or repetition of the same exercise).

Individual peculiarities in application to the different occupations.

To what work he applies himself successively in the same day and with what constancy.

If he has periods of spontaneous diligence and for how many days.

How he manifests his need to progress.

What occupations he chooses in their progression, remaining at them with persistence.

Persistence in spite of stimuli in the environment which would tend to distract his attention.

If after an enforced distraction he returns to the work which was interrupted.

CONDUCT

Note the state of order or disorder in the acts of the child.

His disordered acts.

Note if there are changes of conduct during the development of the phenomena of work.

Note whether, in the establishing of order in his acts, there are:

Crises of joy,

States of serenity,

Manifestations of affection.

Interest which the children take in the development of their companions.

OBEDIENCE

Note whether the child responds to invitations when he is called.

Note whether, and when, the child begins to join in the work of others with intelligent effort.

Note the establishment of obedience to requests.

Note the establishment of obedience to commands.

Note when the child manifests obedience.

Note the relations between the various phenomena of obedience in its grades—

(a) With the development of work.

(b) With changes of conduct.

Observations on Physical Development

The record of the child's physical development takes the following form.

Weight (weekly).

Height—standing and sitting (monthly).

Head—circumference, maximum anterior-posterior and transverse diameters (yearly).

Thoracic perimeter (yearly).

From these are calculated and recorded—

(1) The Ponderal Index

$$\frac{\text{Weight} \times 100}{\text{Height standing.}}$$

(2) The Index of Stature

$$\frac{\text{Height sitting} \times 100}{\text{Height standing.}}$$

(3) The Cephalic Index

$$\frac{\text{Transverse diameter of head} \times 100}{\text{Anterior-posterior diameter.}}$$

The measurements are taken on the day of the week, month or year on which the child was born, so that the teacher has only a small group of children to measure daily.

They are recorded on printed forms, separate copies of which are provided for each child. Groups of related facts are kept upon separate sheets for ready reference, or for regrouping in the case of future research.

In addition to a record of the child's development during his school life, account is also taken of his past history. Inquiry is made as to the age at which the teeth were cut, and at which the child walked and spoke; any illnesses which he may have had; facts relative to his birth (normal or otherwise); age at which his parents contracted marriage, their illnesses, etc. His home environment also has an important influence upon his life, and particulars are gathered as to the wealth, social position and habits of the family.

These particulars may be elicited little by little by the teacher in her intercourse with the child's parents; her opportunities are exceptionally good in this respect in the case of the "schools within the home," in which she lives in the same block of dwellings as those from which the children are drawn.

The importance which such a body of facts would have in the scientific world, should their collection be made upon a large scale, can hardly be overestimated. Almost every branch

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of modern science dealing with the different aspects of man's life would derive from it direct or indirect data or assistance. Medicine, for instance, should find valuable help in diagnosis from the biographical chart; while the results upon the children of the method itself, in calming them, revealing almost a new child nature as regards mental characteristics, should be of great interest to the specialist in children's diseases and nervous ailments.

For psychology, a new field of research is opened which should bear rich fruit, especially in the sphere of psychogenesis. From the social inquiries, too, much might be expected, criminality, jurisprudence and political science today tending to find new foundations in the social conditions of the home, and the biological history of the individual. The new science of eugenics also derives data from such inquiry. The new field of study, in fact, which this method opens up, fills a void in our knowledge of man and the laws of his life, which must have the widest relationships with the other aspects under which he is studied; and perhaps, in its development, it may even be found to shed illumination upon some of the difficult, disputed questions of morality and religion. M.M.

Henry N. Holmes, in his introduction to Madame Montessori's book, writes as follows:

> Dr. Montessori's views of childhood are in some respects identical with those of Froebel, although in general decidedly more radical. Both defend the child's right to be active, to explore his environment and develop his own inner resources through every form of investigation and creative effort. . . . . In the practical interpretation of the principal, however, there is decided divergence between the Montessori school and the kindergarten. The Montessori "directress" does not teach children in groups, with the practical requirement, no matter how well "mediated," that each member of the group shall join in the exercise. The Montessori pupil does about as he pleases, so long as he does not do any harm.

Consult George's *The Montessori Method*, a translation of one of Madame Montessori's books; Boyd's *From Locke to Montessori: A Critical Account of the Montessori Point of View*; Ward's *Maria Montessori and the American School*; Fisher's *The Montessori Manual*.

MONTEVIDEO, *mon te vid' e o,* known officially as SAN FELIPE Y SANTIAGO DE MONTEVIDEO, is the capital and principal seaport of Uruguay. It is 120 miles east-southeast from Buenos Aires, and faces the broad arm of the sea known as the Rio de la Plata. The shortened name of the city is a Latin phrase meaning *I view from the mountain,* and is pronounced regularly as indicated above. The residents of the city, and travelers very generally, pronounce it in Spanish fashion, accenting the syllable next to the last. The city was founded in 1726, though the Portuguese had established there a small fortress in 1717. From an ancient inscription (discovered in 1827) the site would seem to have been visited three centuries before Christ by Ptolemy, an officer of Alexander the Great (see URUGUAY). The population in 1915 was 364,185.

Montevideo is generally laid out in rectangular squares, with well-paved streets, and is one of the world's cleanest cities. With its equable climate it is a favorite resort for tourists in that part of the world; the city government has recently purchased the elegant Hotel Parque, to be maintained through all seasons. The city is built chiefly of brick or of rough stone, covered with plaster. The great cathedral (consecrated as such in 1869) was begun as a parish church in 1804. The ancient *cabildo* is now the statehouse. The dwellings generally have flat roofs, with observation towers. There are more than forty charitable institutions, a national museum and a public library (founded, respectively, in 1833 and 1835), a British hospital, for sailors especially, an Italian hospital, the university, institutions for the insane, etc. Playa Ramirez and Pocitos, to the east, are popular bathing places. The harbor is naturally a rather shallow bay, nearly circular in shape, with an opening of about two and one-half miles. Breakwaters have been supplied for the outer harbor, and the entrance channel has been so dredged as to admit the largest steamships. A great embankment on the shore line, dry docks and the terminals of four railways are among the features of the city. J.S.C.

MONTEZUMA, *mon te zoo' ma* (about 1479-1520), the last ruler of the Aztecs of Mexico, whose fame is due to his conflicts with the Spanish conqueror Hernando Cortez (which see). Montezuma had been ruling in Mexico City (then called Tenochtitlan) for seventeen years when the news was brought to him of the invasion of the Spaniards. Unable to prevent their entering his city, he afterwards proved himself so weak and vacillating that in a short time the foreign visitors had securely established themselves. Montezuma allowed himself to be kept a prisoner, and when the Aztecs could no longer tolerate the overbearing conduct of the Spaniards they called upon the emperor's brother to lead them in a revolt. While this rebellion was in progress Montezuma died. Some authorities say the Spaniards killed him. The invaders themselves gave out

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ain by a stone hurled by
while he was attempting
e roof of the palace. See
vernment and History.

MONTEZUMA

Illustration drawn from an old copperplate engraving.

MONT'FORT, Simon de, Earl of Leicester (about 1208-1265), a famous English statesman and soldier, prominent in the development of the British Constitution. He was born in France, but went to England in 1230 and soon found favor with Henry III, who restored to him the lands which had once belonged to his grandmother. In 1238 he was married to the king's sister, Eleanor, and two years later went on a crusade to the Holy Land.

As governor of Gascony from 1248 to 1252, ...urred the disfavor of Henry, and although ...ciliation was effected, he became ... barons in their protests ... exorbitant de- ... 1258, to Henry at Lew... which they forced fro... the real ruler of the kingdom. ... ment which he summoned in 1265 he ... representatives of the people, and thus insti... tuted the House of Commons. Later in the same year there was a battle at Evesham between the royalist forces and the barons, in which Montfort was killed.

MONTGOMERY, *mont gum' er i,* Ala., the capital of the state and the county seat of Montgomery County, is about fifty miles southeast of the geographical center of the state, at the head of navigation on the Alabama River. Birmingham is 100 miles northwest, Atlanta is 175 miles southwest. The city is an important gateway of the South, having unusually good transportation facilities through the Louisville & Nashville, the Central of Georgia, the Mobile & Ohio, the Western of Alabama, the Atlantic Coast Line and the Seaboard Line. Steamers operate from Mobile to Montgomery, a distance of 400 miles, except during periods of excessive drought. In 1910 population was 38,136; in 1916 it was (Federal estimate), less than five per cent foreign born. The area is nearly seven miles.

Montgomery is located on a high bluff which rises from the river, in of a rolling, picturesque country. large, old-fashioned homes, with grounds and an abundance of foliage throughout the year, give ance of a city of the Old South pace with the industrial and com of the New South. The busi in the valley, and the reside the hills.

Buildings and Institutio... state Capitol is the most ... structures; the central bui... tol of the Confederate Department of Archives north wing. The museu the Confederate Mont... terest. Estelle Hall, hall, Masonic Temple Lanier high school which cost $250,000 cost $112,000 in buildings. Montg... of Alabama ...

Commerce and Industry. Montgomery lies in the famous "Black Belt," a band of rich, dark soil, which produces an abundance of cotton, grain, fruit, vegetables, timber and live stock. The city is the great central market for this region, and a foremost trucking center for the supply of vegetables to Northern markets. It is one of the chief cotton-shipping cities of the South. Coal and iron-ore are found in the vicinity. In the list of industrial plants cotton mills, cottonseed oil mills and fertilizer plants are most important. There are over fifty wholesale houses and more than 100 manufacturing plants, besides railroad repair shops.

History. Andrew Dexter was the founder of the city. It was the site of the legendary Indian village called *Ecunchatty,* and Dexter named it New Philadelphia. In 1819 it was consolidated with East Alabama Town as Montgomery, named in honor of General Richard C. Montgomery, of Revolutionary War fame. It was incorporated in 1837 and supplanted Tuscaloosa as the state capital in 1847. In 1849 the Capitol was destroyed by fire and was replaced by the present one in 1851. The city's interests and large colored population made it the focus of the secession movement. It became the first capital of the Southern Confederacy, and for this reason was called *The Cradle of the Confederacy;* here Jefferson Davis was inaugurated as President. In 1910 the city adopted the commission form of government. B.K.

MONTH, *munth,* a period of time measured by the motion of the moon. The word originally meant the time during which the moon makes a complete revolution, but as that might be a revolution with reference to one of several heavenly bodies, special names are applied to the different periods. Thus, the revolution of the moon from perigee to perigee (see PERIGEE) is called the *anomalistic month;* it has an average length of 27 days, 13 hours, 18 minutes, 37.4 seconds. The *sidereal month* is the period during which the moon, if viewed from a fixed star, would seem to make a complete revolution around the earth; this month is 27 days, 7 hours, 43 minutes, 11.5 seconds. The *proper lunar month,* often called the *synodical month,* is the period from one new moon to the next, an average of 29 days, 12 hours, 44 minutes, 2.7 seconds. The synodical month is one of the three natural divisions of time, the other two being the revolution of the earth on its own axis and its revolution around the sun. Another astronomical month is the *solar month,* a twelfth part of the solar year. The solar month, in other words, is the time taken by the sun to pass through one of the signs of the zodiac.

A calendar month is one of the twelve parts into which the year is divided. In order that twelve calendar months might equal twelve synodical, or true, months, the calendar months were originally reckoned as 29 and 30 days, alternately. This rough approximation was superseded by other attempts to secure a proper relation between the lunar, solar and calendar months. The calendar month now varies from 28 to 31 days (see article on each month).

Days of the Month. In the Gregorian calendar each day of the month is known by a number, as the first, or the second, or the twentieth. This has not always been the case. The ancient Greeks divided the month into three periods of ten days, and the French Revolutionary calendar, in which all the months were of equal length, used the same system; thus the 15th day of the month was called the fifth day of the second decade. The Romans used an even more complicated system. The Roman calendar had three fixed days in each month, the *calends,* the *nones* and the *ides.* From these fixed days the Romans counted backward. The calends were invariably the first day of the month; the ides were at the middle, either the 13th or the 15th day; and the nones were the ninth day before the ides, both days being counted. Thus is explained the definiteness of the warning to Julius Caesar to "beware the ides of March." The days between the calends and the nones were called *the days before the nones;* those between the nones and the ides, *the days before the ides;* those between the ides and the calends, *the days before the calends* of the following month. Thus the last day of February would be called *the day before the calends of March* (see CALENDAR). W.F.Z.

MONTICELLO, *mon ti sel'o,* the home of Thomas Jefferson (which see).

MONTMAGNY, *mawN'ma'nye,* the county town of Montmagny County, Quebec. It is on the south bank of the Saint Lawrence River and on the Intercolonial Railway, thirty-six miles east of Levis, which is opposite Quebec, on the Saint Lawrence. Montmagny has important lumbering interests, and among its industrial establishments are lumber, saw and planing mills, a pulp mill, sash and door factory and a wagon factory. There are also several foundries, shell factories, gristmills and butter factories. The town has the county

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courthouse and jail, a registry office, customs-house, a convent school and an asylum for old people. The city hall is also a prominent structure. The town was founded about 1700, and was incorporated in 1883. Population in 1911, 2,617; in 1916, about 3,000. A.J.B.

MONTMORENCY, a distinguished family of France which has been prominent in historic affairs since the twelfth century. MATTHIEU II (1189-1230) was the first to win fame; he held a position of great power under Philip Augustus and his successor. ANNE DE MONTMORENCY (1493-1567), the first to bear the title of Duke, was one of the most illustrious of the line, serving ably both in war and in peace under Francis I and under Henry II. He was killed in battle against the Huguenots.

The grandson of the first duke was HENRY DE MONTMORENCY (1595-1632), who bore the titles of Admiral of France and Viceroy of Canada. Like his grandfather, he won victories over the Huguenots, and also defeated the Spaniards in a sharp battle, but he won the enmity of Richelieu, was accused of treason, and on October 30, 1632, was put to death.

Two members of this family, the Duke of Montmorency-Laval (1766-1826) and his father, served in the Revolutionary War in America, and the son later took a prominent part in the French Revolution.

MONTMORENCY, *mont mo ren' si,* **RIVER,** a short, swift stream which flows into the Saint Lawrence six miles below the city of Quebec. At its mouth are the famous Montmorency Falls, 150 feet wide and 265 feet high, about 100 feet higher than Niagara. A visit to the falls is one of the most attractive side trips from Quebec, and is made by thousands of tourists each year. The power obtained from the falls is of great importance to the city of Quebec. The river has its source in Snow Lake, about forty-five miles northeast of Quebec. It was named for François Xavier de Laval-Montmorency, the first bishop of Quebec.

MONTPELIER, *mont pe' li er,* VT., the capital of the state and the county seat of Washington County, is situated northeast of the geographical center of the state, on the Winooski (Onion) River. Barre is six miles southeast, and Burlington is forty-two miles northwest. The Central Vermont and the Montpelier & Wells River railways serve the city, and an electric line extends to Barre. Although a charter to the land was obtained in 1781, no permanent settlement was made here until 1789. In 1791 the town was organized, in 1805 it was chosen as the capital, in 1855 it became a village and in 1895 it was incorporated as a city. It was named for the French city of the same name. Italians comprise about one-seventh of the population, which in 1910 was 7,856.

Montpelier has a picturesque setting in the midst of some of the most beautiful scenery of a state famous for its verdure-clad mountains. The valley in which it is located is rich in agricultural products, and large shipments of hay, potatoes, dairy products, poultry, granite and lumber are made from this point. Granite works, flour and lumber mills, tanneries, hardware and saddlery works and creameries are the leading industrial establishments. The most notable building is the Capitol, an imposing structure of granite, with a dome 124 feet high, surmounted by a statue representing *Agriculture.* At the entrance, under the portico, are a marble statue of Ethan Allen, an American soldier of Revolutionary fame, and two field pieces from the battlefield of Bennington.

Other buildings worthy of note are the $160,000 Federal building, the city hall, Wood Art Gallery, Kellogg-Hubbard Library, Saint Augustine's church and Heaton Hospital. Besides the public schools the city has Montpelier Seminary (Methodist Episcopal) and the state and public libraries. The Vermont Historical Society, located here, has in its possession the old Daye press on which the first Vermont newspaper was printed. Montpelier was the home of Admiral George Dewey and Rear-Admiral Charles E. Clark. L.A.K.

MONTPELLIER, *mawN pe lya',* a city near the Mediterranean coast of France, noted for its healthful climate, sunny skies and delightful situation in the midst of beautiful gardens, orchards, vineyards and olive groves. It lies about six miles from the shore, on the Les River, and about seventy-six miles northwest of Marseilles. It is the capital and principal city of the department of Herault, and contains the oldest botanical garden of Europe and a celebrated university, in which Petrarch was a student. The school of medicine was founded by Munich physicians in 1289. A public library containing 30,000 volumes, an art gallery, institutes of science and art, an observatory and a cathedral are points of interest. The important manufactures include woolen and cotton goods, chocolate, chemical products, liquors and perfumes. An active trade is carried on through Cette, its Mediterranean port. Montpellier was the birthplace of the French philosopher Isidore Comte. Population, 1911, 80,230.

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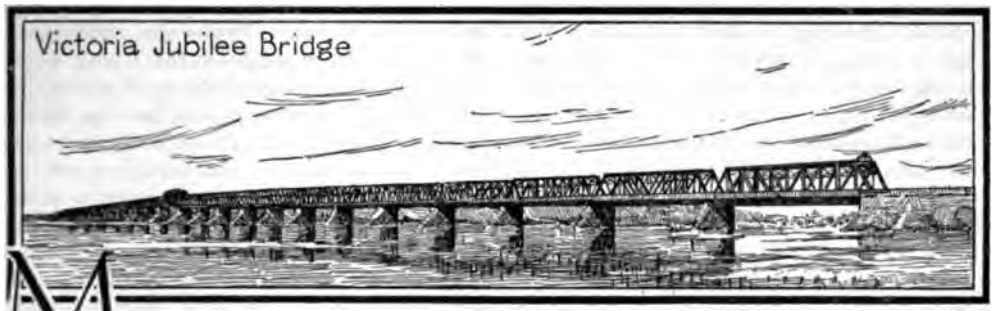

MONTREAL, the largest city of Canada, said to have been founded on mysticism and faith, is situated on the island of Montreal in the province of Quebec, at the meeting place of ocean and inland navigation on America's greatest waterway, the Saint Lawrence River and the Great Lakes. Montreal is 164 miles southwest of Quebec, 950 miles from the Atlantic Ocean by way of the Strait of Belle Isle, and 420 miles by rail north of New York. Although Montreal is a thousand miles from the Atlantic, it is 300 miles nearer Liverpool than is New York.

General Description. The island of Montreal is formed by the confluence of the Ottawa and the Saint Lawrence rivers. The island is about thirty miles long and ten miles wide at its widest point. Its most striking feature is Mount Royal, whose summit is 753 feet above sea level and from which the city takes its name. The entire island is covered with farms, towns, villas and the great city, which is located on its southeast side. The site of Montreal rises in a gentle slope from the river to the base of the mountain, on which a part of the city rises in a succession of beautiful terraces.

Sprung from the hope of noble hearts,
  Brought into being through sacrifice
Of men and women who played their parts,
  And counted not their lives as price,
She has grown in her strength like a Northern Queen
  'Neath crown of light and her robe of snow,
And stands in her beauty fair, between
  The Royal Mount and the River below.
—McLennan.

The river in front of the city is fully two miles wide. Near the north bank and just without the harbor lies a group of small islands. The largest, Saint Helen's Island, was formerly used as a military post, but it is now a park. Greater Montreal extends along the river front for about nine miles and from four to seven miles back from it. The longest streets follow approximately the direction of the river, but owing to the irregularities of the surface they are not all parallel. The streets extending from the river towards the mountain cross the longer streets at right angles, and, with few exceptions, are parallel. This plan was adopted in 1672 and has been rigidly followed.

The river front is lined with great wharves to accommodate the shipping. Here ample facilities are provided for handling cargoes in the shortest possible time. Freight sheds, huge cranes, railroad tracks, grain elevators and a wilderness of masts and spars form the characteristic features of this part of the city. The wholesale district lies near the river, and beyond this is the retail district with its numerous stores, shops, banks and skyscraper office buildings. Notre Dame, Saint Paul, Saint James, Craig, Saint Catherine, McGill, Bleury, Ontario and Wellington are the principal business streets. Saint Lawrence Street forms the division between the east and west sections and was formerly considered the dividing line between the French and the English parts of the city. Some of these streets near the river are very narrow. Sherbrooke Street and the streets along the mountain side are noted for their fine residences.

Montreal, like Boston, shows in its architecture the transition from the past to the present, from the old to the new. Most of the buildings are modern. They are constructed of gray limestone which is quarried near by. These structures give the city an appearance whose chief characteristics might be expressed as beauty and stability. But in the older part of the city are found now and then quaint structures of an earlier day, some of them dating back nearly two centuries. Between Notre Dame Street and the harbor is the oldest part of the city, and here a number of these quaint old houses may still be seen, the most perfect example being the Hubert-Lacroix House on Saint Jean Baptiste Street. The walls of these old houses are of small boulders cemented to-

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gether with an abundance of mortar, and are frequently from two to three feet thick. The stones are often of different colors, giving the building a mottled appearance, not seen in any other style of architecture.

Parks, Monuments and Buildings. Montreal is well supplied with small parks locally called *squares* or, in the French, *places*. At the center of the city's activities is the Place d'Armes, a small square surrounded by noted buildings and ornamented by Hébert's fine bronze statue of Maisonneuve, the founder of the city. Facing this square on the south is the great cathedral of Notre Dame, to the north is the Bank of Montreal, a fine example of Corinthian architecture. The sculpture on the pediment in front is not excelled by any similar work in America. To the east of the Bank of Montreal is the Royal Trust Building, a modern granite structure, and to the west is the post office. Further west on Saint James Street are a number of fine buildings, including the Royal Bank, the Bank of British North America, the Bank of Commerce, Mólson's Bank and the Merchants' Bank.

A few blocks farther east on Notre Dame Street is Jacques Cartier Square, with a monument to Lord Nelson, the hero of Trafalgar. Facing this square on the north are the courthouse and the city hall. Facing the city hall on the opposite side of the street is Château de Ramezay, erected in 1705 by Claude de Ramezay, Governor of Montreal, and occupied by him as a residence. It is now a museum of Canadian historical relics. South of this building and near the river is Bonsecours Market, easily recognized by its great dome. Adjoining the market on the east is a small church, one of the picturesque features of the water-front, an outstanding relic of the past. The foundation and a part of the walls of the present structure date from 1675. One block east and a block north of the market is Place Viger, partially surrounded by a station of the Canadian Pacific Railway, the Place Viger Hotel and the Commercial High School. At the intersection of Saint James and McGill streets is Victoria Square, in the center of which is a beautiful bronze statue of Queen Victoria.

One of the largest and most attractive parks in the heart of the city is Dominion Square, between Windsor and Cathedral streets. The entire park is laid out in walks, lawns and flower beds and is considered by some travelers to be the most beautiful square in the world. Across the street to the southwest is the magnificent Windsor station of the Canadian Pacific Railway. Facing the square from the west are the buildings of the Young Women's Christian Association and the Windsor Hotel, while on the opposite side rises the façade of the great Saint James Cathedral. A bronze statue of Sir John A. Macdonald adorns the north end of the square, and near by is a fine monument to the Strathcona Horse, which served in the Boer War.

Mount Royal Park, with an area of 460 acres, the largest in the city, contains drives, footpaths and numerous shady nooks where one may wander amid trees, shrubbery and flowers. The reservoirs from which the city is supplied with water are located here at an elevation that gives sufficient pressure without the use of pumps. There are two lookouts near the summit from which the observer beholds a broad and varied panorama. At his feet lies the city with its domes and spires. In the distance is a broad and fertile plain, from whose background rise isolated peaks of the Montenegrin Hills—Boucherville, Rougemont and Saint Hilaire—while between, at the edge of the city, flows the Saint Lawrence, changing its hue with the changing skies.

> The river flows in its beauty rare;
> While across the plain eternal rise
> Boucherville, Rougemont and Saint Hilaire.

Lafontaine Park and Saint Louis Square in the eastern part of the city are also favorite resorts.

Churches. Montreal is said to have more large churches than any other city in America. Be this as it may, the churches and other religious institutions are many, and the religious life of the inhabitants dominates the city. Three Roman Catholic churches deserve special mention, and foremost among them is the Cathedral of Notre Dame, facing the Place d'Armes. The building is rectangular, and the architecture is composite Gothic. Two massive towers rise from the front corners to the height of 220 feet, constituting a landmark that can be seen for a long distance in any direction. In the west tower is the largest bell in America, *Le Gros Bourdon*, whose weight is twelve and three-fourths tons. From the top of this tower a fine view of the city and the surrounding country can be obtained. The interior is one vast auditorium with two galleries on each side. It has a seating capacity of 12,000 and can accommodate an audience of 15,000. In its impressive effect and its appointments, Notre Dame more closely approaches the great ca-

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thedrals of Europe than any other edifice in the New World.

Saint James Cathedral, facing on Dominion Square, is patterned after Saint Peters in Rome and is one-third the size of that cathedral. It is built in the form of a cross, and from the center a dome, seventy feet in diameter, rises to the height of 210 feet. Rising above the dome is a gilt ball on which is placed a large cross which bears electric lights. The Jesuit Church on Bleury Street is famous for its frescoes.

Among the Protestant churches are Christ Church Cathedral, on Union Avenue, said to be the most perfect church in Canada, architecturally; Saint Andrews, a fine specimen of Gothic architecture; Saint James Methodist; Dominion Square Methodist, and Saint George's, one of the most magnificent Anglican churches, are prominent.

Education. Montreal has two distinct school systems, Roman Catholic and Protestant, with separate boards of commissioners (see QUEBEC [province], subhead *Education*). The various boards raise their own taxes at a rate fixed by the provincial government, on the system prescribed in the article on the province. The instruction under each board is of a high order, and the schools are characterized by thoroughness and efficiency. The Protestant Board of Commissioners maintains a high school for boys, a high school for girls and a commercial and technical high school for both boys and girls. The leading educational institution of the city is McGill University (which see). Laval University of Montreal occupies a position in the Roman Catholic system of schools similar to that occupied by McGill in the Protestant system. The elementary and high schools under each board lead respectively up to these universities. (See LAVAL UNIVERSITY.) The Catholic Board of Commissioners has control of six other colleges and the Jacques Cartier Normal School, widely known for its library of Canadian historical works. These were used by Parkman in preparing his valuable works on American history. There are many theological, medical, law and technical schools in the city and its suburbs.

The most important learned societies are the Natural History Society, which maintains a valuable museum; the Numismatic and Antiquarian Society, which has done much to preserve the identity of the historic sites in the city and which maintains the museum in Château de Ramezay; the Montreal Society for Historical Studies, and a number of societies connected with the universities. There are a number of valuable libraries connected with the educational institutions, the most important being that of McGill University. The public library is far from adequate to the city's needs, but a fine, new building on Lafontaine Park will house an enlarged library. A library much used by the public is that of the Fraser Institute.

Benevolent Institutions. A number of convents maintained by Catholic orders are engaged in benevolent work. One of the largest of these is the Grey Nunnery, which cares for deserted children and the sick and unfortunate of all sects. The city has a number of hospitals, among which the Royal Victoria Hospital is the most important. This was the gift of Lord Strathcona and Lord Mount Stephen and is one of the largest and most completely equipped hospitals on the continent. A large addition has been built by J. K. L. Ross. The other large hospitals are the General Hospital on Dorchester Street, the Western Hospital and the Homeopathic Hospital on McGill College Avenue. Hotel Dieu, a convent, is the largest Roman Catholic hospital. The Notre Dame Hospital is also important.

Commerce and Industry. Montreal is not only the chief commercial center of the province of Quebec, but of the Dominion of Canada, and its commercial rank is due to its location. The canals around the rapids in the Saint Lawrence River and those connecting the Great Lakes enable lake steamers to meet ocean steamers at this point. Montreal is the natural port of exchange between ocean and inland navigation, and, notwithstanding the fact that its port is open only seven months in the year, it handles nearly fifty per cent of the total trade of Canada for this period. The great Canadian railways—the Grand Trunk, the Canadian Pacific—have their headquarters here, and the Intercolonial and Canadian Northern enter the city, as do the New York Central, Central Vermont, and several other lines from the United States.

The Victoria Jubilee Bridge over the Saint Lawrence has a length of one and one-fourth miles between abutments. The first bridge, a tubular structure, was completed in 1860 and was considered to be the eighth architectural wonder of the world. In 1898 this was replaced by a steel arch bridge having tracks for electric cars, driveways and walks, in addition to the railway tracks.

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Montreal is favorably situated for cheap power and for obtaining raw materials, and the city is naturally an important manufacturing center. The annual output of the manufactories of the city and its suburbs is about $200,000,000. The leading products include textiles, leather and leather goods, tobacco and tobacco products, iron and steel products, paper and printing, and flour, Montreal having the largest flour mill in Canada.

Montreal is a strong financial center, and ranks sixth among the cities of the United States and Canada in its bank clearings.

The People. Montreal was founded by the French, and for many years it was wholly a French city, but as the city gained in commercial importance the English and Scotch entered. Of recent years there has been a very large immigration from Europe, which has made Montreal one of the most cosmopolitan of cities. The Jews (largely Russian and Polish) now number over 50,000, and there are large colonies of Italians, Ruthenians and Russians, with considerable representation of many other races of Southeastern Europe, and a number of Syrians and other Asiatics, including a small colony of Chinese. The French constitute more than half of the total population. Both languages are spoken throughout the city, though French predominates in the east and English in the west. The Jews (speaking mostly Yiddish, but rapidly learning English) have pushed northward from the center of the city; their children practically fill the Protestant schools in this section—the law regards them as Protestants for educational purposes. The bulk of the Ruthenian and allied populations is to be found in the northeast and in Point Saint Charles, westward along the river front. The newer immigrants, especially those of Slavic race, are following northward from the river in the tracks of the Jews. All the immigrants as they mix with the older element become English-speaking; meanwhile a great variety of languages is always heard, and there is a great field for the interpreter. Newspapers are issued in several languages; naturally the majority are in French and English.

History. Referring to Montreal's growth and modern development, a recent writer says:

> The metamorphosis of Montreal is, perhaps, after all the chief miracle of Canada. . . . . It is as if Rome were to clothe herself in the garments of Chicago.

The site of Montreal was first brought to the attention of white men in 1535, when Jacques Cartier (which see) sailed up the Saint Lawrence and discovered the Indian town of Hochelaga at the foot of the mountain. Cartier never returned and the next white visitor was Samuel Champlain (which see), in 1611. Champlain at once recognized the advantage of the place for a trading post and the site of a future city. He named the island in front of the present city Saint Helen's, in honor of his wife, who was the first French woman to come to America.

MONTREAL IN 1760

Two years later he again visited the place to establish a trading post, but his plan was not carried out. The city was founded in 1642 by Paul de Chomedy, Sieur de Maisonneuve, who with Father Vimont and about sixty followers landed on May 18, where the customhouse now stands. An altar was erected and mass was said, during which Father Vimont addressed his little band with these prophetic words:

> You are a grain of mustard seed that shall rise and grow till its branches overshadow the earth. You are few, but your work is the work of God. His smile is upon you and your children shall fill the land.

The settlement was named Ville Marie. The pioneers were exposed to great danger from the Iroquois, and actual colonization did not begin until 1653. Four years later the seminary of Saint Sulspice was founded, and within a few years the Sulpicians became owners of the entire island. The settlement soon became an important post for trading with the Indians. In 1762 the city was laid out, and a few years later the town was surrounded by a palisade. In less than fifty years after the landing of Maisonneuve, Ville Marie had a population of over 2,000 and was an important factor in the affairs of New France. For the next century the growth was slow. By the Treaty of 1763 all Canada passed to the British government. During the war of the Revolution Montreal was visited by commissioners from the colonies, who tried to influence Canada to join them in throwing off British control. Benjamin Frank-

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OUTLINE AND QUESTIONS ON MONTREAL

Outline

I. Position and Size

(1) Latitude, 45° 30′ 17″ north
(2) Longitude, 73° 34′ 40″ west
(3) Island location, at confluence of Ottawa and Saint Lawrence rivers
(4) Distance from other large cities
(5) Area
(6) Population

II. Description

(1) Plan of streets
  (a) Longest ones parallel with river
  (b) Principal streets
(2) Wharves
(3) The old and the new in architecture
(4) The parks or squares
  (a) Small parks in heart of city
  (b) Large parks
(5) Notable buildings
  1. Montreal a church city
  2. Cathedral of Notre Dame
  3. Saint James Cathedral
  4. Christ Church Cathedral
  5. Other Protestant churches

III. Institutions

(1) The double system
  (a) Roman Catholic schools
  (b) Protestant schools
(2) Universities
  (a) McGill University
  (b) Laval University
(3) Professional and technical schools
(4) Convents
(5) Hospitals

IV. Commerce and Industry

(1) Chief commercial center of Dominion
(2) Canals
(3) Railways
(4) Value of trade
(5) Manufactures

V. The People

(1) Two dominant nationalities
(2) Two languages spoken
(3) Interesting mingling of customs and styles

VI. History

(1) Early visits to the site
(2) Founding of city
(3) Slow growth
(4) English rule established
(5) Rapid recent growth

Questions

What does the name *Montreal* mean?

Why are no pumps necessary in the water system of the city?

How can this city which is so far inland be nearer England than a coastal city?

What is considered by some visitors the most beautiful square in the world?

What position does Montreal occupy commercially among the cities of the Dominion? Why?

What was considered at the time of its construction the "eighth wonder of the world?"

Why are the longest streets not all parallel?

What is *Le Gros Bourdon,* and what distinction does it possess?

How do the manufactures of Montreal compare in value with those of Boston? Of Philadelphia?

What structure is patterned after one of the most famous buildings in Europe? How does it compare in size with the original?

What is there that is especially interesting about the character of the population?

Of what are many of the picturesque old houses built?

Who was the first French woman who ever came to America? Who founded Montreal? Where is a statue of him to be found?

Why are two distinct school systems necessary?

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lin was one of the number, and he brought the first printing outfit to the city. With this a newspaper was established which later became the Montreal *Gazette* and has had a continuous existence to the present day. In 1775-1776 the city was occupied by Continental troops, but the Canadians refused to side with the colonies and the troops withdrew.

From the close of the Revolutionary War to the middle of the nineteenth century the city grew slowly but steadily. Then the turning point in its commercial history came, with the advent of the Grand Trunk Railway and the establishing of the Allan Line of Steamers, the first transatlantic line to enter its port. A ship canal around the rapids was completed in 1849, and in 1860 the completion of the Victoria Bridge gave the Grand Trunk entrance into the city. From that time to the present the city's growth has been steady and substantial. Maisonneuve's little settlement of less than a hundred has become a metropolis with over half a million souls. The population in 1911 was 470,480. In 1915 it was estimated at 570,000, and with the suburbs at 656,500. J.A.D.

Consult Sandham's *Villa Marie: or Sketches of Montreal, Past and Present;* Hinshelwood's *Montreal and Vicinity.*

MONTS, *mawN,* PIERRE DU GUAST, Sieur de (1560-1611), a French explorer and colonizer, remembered as the founder of Acadia. De Monts, who was wealthy and a favorite at court, first appears prominently in 1603, when King Henry IV appointed him governor of the French Company of Canada, with the additional titles of vice-admiral and lieutenant-general. The French Company was given exclusive control of the fur trade between latitudes 40° and 50° north, and also the right to govern the country, which was named Acadia. With Poutrincourt and Champlain as his chief officers, De Monts embarked at Havre, France, on March 7, 1604. The party explored the Bay of Fundy, spent the winter of 1604 to 1605 on a small island at the mouth of the Saint Croix River, and in the summer of 1605 founded Port Royal (now Annapolis). Leaving Poutrincourt behind as governor, De Monts returned to France. There he found that jealousy because of his monopoly and his apparent success had led to the cancellation of his privileges, but he managed to recover a part of them and for several years continued to send out expeditions to Canada. One of these expeditions, led by Samuel Champlain, founded Quebec in 1608. After the death of King Henry IV, in 1610, De Monts was again deprived of all his privileges, and he died a poor man.

MOODIE, *moo'di,* SUSANNA (1803-1885), a Canadian novelist and poet, famous for her vivid pictures of pioneer life in Canada. Her best-known work is *Roughing It in the Bush.* Others of her books are *Enthusiasm,* a volume of poems; *Life in the Clearings; Mark Hurdlestone, the Gold Worshipper,* her most ambitious novel; *Geoffrey Moncton* and *Dorothy Chance,* both novels. Mrs. Moodie was one of a family of five sisters, all of whom are remembered for their writings. Two of them, Agnes and Elizabeth Strickland, wrote popular histories and historical biographies, and a third, Mrs. Catherine Parr Traill, like Mrs. Moodie, wrote sketches of pioneer life in Canada. With her husband, who was a British officer, Mrs. Moodie emigrated in 1832 from England to Upper Canada. They settled first at Port Hope, but later lived for eight years in the backwoods north of Peterborough. Mrs. Moodie's first attempts at writing were short poems and stories for children, but most of her later work was sketches of Canadian life and fiction.

MOODY, *moo'di,* DWIGHT LYMAN (1837-1899), one of the most widely-known of American evangelists. He was born in Northfield, Mass., and for several years was clerk in a shoe store in Boston, leaving that city in 1856 for Chicago, where he entered Christian work and organized a large Sunday School. His work as an evangelist was remarkably successful, and a nonsectarian church was organized, with Moody as its pastor. In the great fire of 1871 its building was burned, but another was built which is still known as the Moody Tabernacle.

Accompanied by the singer, Ira D. Sankey, he visited Europe in 1873, and great religious awakenings were the result of the services they held. He and Sankey also held revival meetings throughout the United States, and Moody founded the Moody Bible Institute in Chicago. His later years were devoted to the upbuilding of a seminary for young women in Northfield, and the Mount Hermon School for Boys at Gill, near that place. He inaugurated the custom of holding summer conferences for Bible study and religious training, also at Northfield. He published *How to Study the Bible, The Way and the Word* and *Secret Power.*

MOODY, WILLIAM VAUGHAN (1869-1910), an American poet and dramatist whose early death was a distinct loss to American literature. He produced one play, *The Great Divide,* which

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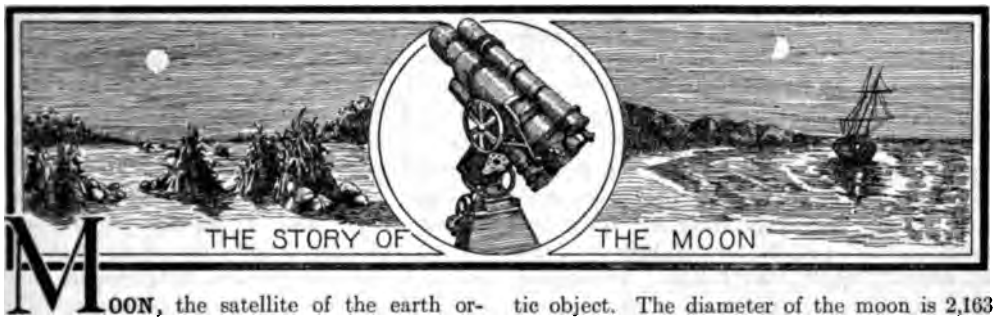
was the sensation of its season, and which is still considered one of the most notable dramas written in America. His lyric work gave him rank, in the judgment of many critics, as the most promising poet of his time. *Gloucester Moors, The Daguerreotype, An Ode in Time of Hesitation* and *Good Friday Night* show the varying phases of his *genius,* and *The Menagerie* is an especially striking discussion of evolution. A second drama, *The Faith-Healer,* is interesting and convincing as a "reading" drama, but on the stage it did not have the success of *The Great Divide.*

Moody was born at Spencer, Ind., was graduated at Harvard, and for a time taught English there and at Radcliffe. In 1895 he became instructor in English at the newly-founded University of Chicago, and six years later he was made assistant professor. Though he was an inspiring teacher, he disliked classroom work; his published *Letters* show how the academic atmosphere irked him.



MOON, the satellite of the earth ordained at the Creation to "light the earth by night." It moves in its own orbit round the earth in 27 days, 7 hours, 43 minutes. From the earliest days of history the moon has been an object of human observation, speculation and attraction. Poets call the moon the "Queen of the Night" and other romantic names; it is popularly recognized as the most attractive and mysterious object in the heavens, and, except the sun, the most dominating.

Formation. It was once considered that the moon was formerly a part of the earth cast off into space, becoming finally a separate planet. The planetesimal hypothesis accounts differently for the creation of the sun, earth and moon (see NEBULAR HYPOTHESIS). The sun became the center of a huge system, with the earth as a satellite, the earth in turn having in the moon a satellite. The moon is of the same formation as the earth but the essence of the composition has been exhausted. Some scientists maintain that the earth is gradually cooling, that in time in almost a countless number of years, the earth will become dead and no life will exist. The surface of the earth will then be like that of the moon, lifeless and cold.

Size, Weight and Distance. It seems incongruous, in view of popular and romantic ideas associated with the moon, to reduce it to measurable size and weight. But modern science takes no heed of legends and traditions and regards the moon as a very natural and unromantic object. The diameter of the moon is 2,163 miles. Its average distance from the earth is 239,000 miles. At night, in some of its changing aspects, the moon appears to be close to the earth, shedding its light in soft, soothing rays, but in reality the distance between moon and earth is much greater than is apparent. An express train traveling at the rate of 60 miles an hour would require 3,992 hours to travel from the earth to the moon; that means a period of perpetual travel at the rate of a mile every minute for 166 days and 8 hours, a total of 23 weeks and 6 days. In volume the moon is 1/49 that of the earth, and to make up the full mass and weight of the earth, 81 moons would be required. The moon's density is 3.4 times that of water, the density of the earth being 5.5.

Atmosphere. The moon possesses no light of its own, and all the heat it obtains it borrows from the sun. There is probably an atmosphere surrounding the moon, but that atmosphere would not support life, as the people of the earth understand life. The temperature on the surface of the moon is estimated at about 200° to 300° below zero for two weeks of every month. For the other two weeks the direct rays of the sun probably raise the temperature near its equator at least as high as that of boiling water. It is apparent that no human being could exist under such conditions. A temperature of a little over 100° F. is trying to all residents in temperate zones, while in the United

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States and Canada a temperature of 50° below zero is considered almost the limit of human endurance. Polar expeditions have failed and brave men have been exhausted and frozen to death at a temperature of 69° below zero. If there is life on the moon, that life, whether human, animal or vegetable, must be different from life on the earth. If water exists on the moon, it must be in the form of ice and if there is any air present it cannot exceed in pressure 1/750 part of the pressure of the earth's atmosphere. The moon is perhaps the most studied object in the heavens; more things can be definitely proved concerning it and its motion than concerning any other planet, but there is not yet built a telescope that can detect any cloud or atmospheric effect on or surrounding it.

Weight on the Moon's Surface. The attraction of the moon is only one-sixth of that of the earth. An apple, or other object, dropped from a height above the earth will travel towards the earth at the rate of 16.08 feet the first second (see FALLING BODIES). If dropped above the surface of the moon it would travel only at the rate of 2⅔ feet the first second. A strong man on earth who can easily lift and raise a 56-pound weight over his head with one hand could perform the same feat on the moon with a weight of 336 pounds. The record high jump of earthly athletes would be broken by the merest amateurs, who in the atmosphere of the moon would be able to jump 20 feet as easily as one on earth can step on or off the street pavement.

Its Light. At the full moon the light reflected by it is just 1/600,000 part of the light of the noonday sun. The surface of the moon, viewed from the earth, appears white, but in reality it is a light gray, in places darkened to the color of seasoned sandstone or slate. The light reflected from it to the earth has passed through two stages, or, perhaps, atmospheres. From the sun to the moon the light travels direct; the light is then deflected towards the earth in volume according to the relative position of earth and moon. The light of the moon is simply modified sunlight which has undergone only such changes as are caused by reflection. The moon occupies a curious position in the solar system. It rotates on its own axis, also revolves round the earth, and with the earth revolves round the sun. The same face, or side, of the moon is always turned toward the earth. The light of the small crescent of the new moon is much less than the light of the full moon because the new moon is at such an angle that the light of the sun is reflected only from a small portion of the moon's surface.

Motion. The orbit, or path, of the moon round the earth is elliptical, but constantly changing in its form. The line of apsides, or points of least and greatest distance from the center of motion, continually changes, performing a complete revolution in a little less than nine years. The motion of the moon is eccentric. One night it appears to be very close to some particular star, but the next night far to the east of that star, changing its position about 13° daily. At the time of the new moon the distance between sun and moon is at the lowest, and the moon is said to be in conjunction; at the full moon it is farthest away from the sun, and is in opposition. In its motion the moon is continually oscillatory, constituting what are called librations. Owing to these librations we see really more than half of the moon's surface. Only 41 per cent of the moon is never visible to us and a belt of about 18 per cent at the edge of the moon is alternately visible and invisible, owing to the oscillation.

Craters. Studied through a telescope the surface of the moon appears to be marked with craters of extinct volcanoes, some of them having walls of 20,000 feet in height. Volcanoes on earth have craters of much less depth, the highest mountain mass only reaching a height of 29,000 feet, the crater occupying a very small portion. The moon is often referred to as a dead planet. Whatever life there ever was is extinct. The moon has grown old; its volcanoes are dead; its seas are empty, silent wastes. The volcanoes, in exhausting themselves, have apparently worn out the whole surface of the moon.

IMAGINARY VIEW OF MOON
Showing typical crater ring.

Photography of the Moon. Although modern instruments, especially telescopes of great power, have done much to increase the definite knowl-

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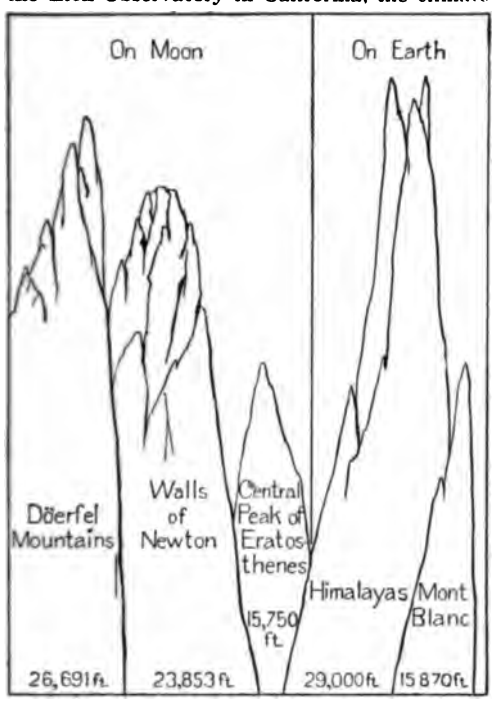
edge of the moon, photography has done more. Telescopic cameras have taken photographs which can be studied at leisure, reproducing faithfully many things that would escape the human eye even when directed by such powerful lenses as those in the great observatories of the United States and England. The first photograph of the moon was taken in New York by Draper, in 1840. The photograph was crude, for the science of photography was in its infancy. The introduction of modern photographic methods has rendered possible photographs showing the surface of the moon as accurately and as much in detail as though it were within one hundred miles of the observer. The finest photographs have been produced at the Lick Observatory in California, the climate



COMPARATIVE ELEVATIONS

being particularly suitable for lunar observations. These photographs are taken by a telescopic camera, mounted on the equatorial principle, following the motion of the moon from rising to setting.

The "Man in the Moon." To everyone the world over, the "man in the moon" is familiar. In many pictures the moon is to be seen with a broad, smiling face looking down on earth, and it has been so for a very long time, for the story of the man in the moon is very old. The Chaldeans, Egyptians, Greeks and Romans all had different stories to account for the presence of "the man in the moon." All stories agree, however, in saying that the man was banished to the moon for bad conduct on earth. The most modern story, although hundreds of years old, is that of the old man who went to a forest to collect wood for his fire. It was Sunday, but still he needed warmth. An angel met him returning with his bundle on his shoulders, and asked him if he had forgotten it was Sunday, when all men should rest. The weary old man replied that Sunday and Monday were alike to him, as he had to work every day to feed and warm himself. The angel said as he could not observe Sunday on earth he should observe *Moonday* in heaven forever. So now the man in the moon is still seen on a clear night, with the fagot of wood on his shoulders.

Other Moons than Ours. Although to people on earth the moon is the most important object in the sky at night, it is in reality almost the most insignificant of all the glories of the heavens; its importance is derived from its nearness, not its size. There are other planets in the solar system which occupy the same relation to the sun as that held by the earth, for Jupiter, Mars, Neptune and Uranus have moons. Jupiter has eight satellites or moons, huge bodies with diameters of 2,000 or 3,000 miles. Mars has two, much smaller than those of Jupiter. Saturn has ten moons, the largest being Titan, 3,000 or 4,000 miles in diameter, at least twice the size of our moon. Uranus, a planet which is 180,000,000 miles distant from the sun, has four moons, which differ from all other satellites in that they revolve backwards. As the moon revolves round the earth, so in distant space those other moons revolve and rotate round their parent planets, and all continue throughout the ages their tireless journeys around the sun.

F.ST.A.

Consult Serviss's *The Moon;* Fauth's *The Moon in Modern Astronomy;* Naysmith and Carpenter's *The Moon as a Planet, a World and a Satellite.*

Related Subjects. The reader is referred to the following articles in these volumes:

Apsides	Harvest Moon
Atmosphere	Nebular Hypothesis
Earth	Sun
Eclipse	Telescope

MOON'FLOWER, a genus of plants belonging to the same family as the morning-glory, dodder and sweet potato, known as the *Convolvulus* family, embracing about 400 species. The greater number of these are twining or

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trailing herbs and shrubs. The moonflower is known as a garden climber, being cultivated for its beautiful white flowers, which are large and sweet scented. These flowers open at night and close in the morning. The vines may be trained to grow to a height of about ten feet; the broad, heart-shaped leaves afford protection from the sun and make an excellent screen for porches. See CONVOLVULUS.

MOONLIGHT SCHOOLS. See SCHOOLS, subtitle *Special Schools.*

MOONSTONE, a whitish variety of feldspar (which see).

MOORE, *moor,* SIR JOHN (1761-1809), a British soldier whose heroic death will make him long remembered. Born at Glasgow, Moore entered the army as a lad of fifteen, serving with marked distinction in campaigns in the West Indies, Ireland, Holland and Egypt. In 1808, at the head of 10,000 men, he was sent to reënforce the British command in the Spanish Peninsula. His plan of campaign contemplated a junction with the forces under General Romana, which was frustrated by the failure of the Spanish commander to coöperate promptly. At Salamanca word reached him that Madrid had fallen and that Napoleon was marching with a superior force to crush him. Forced to retreat, he succeeded in reaching Coruña, after a hurried march across desolate mountains in the most inclement weather. Here, however, Soult forced his exhausted command to give battle. Moore was struck by a rifle ball, and fell just as his troops were achieving victory. The Reverend Charles Wolfe's poem on *The Burial of Sir John Moore,* the opening lines of which are here given, has helped to preserve his memory:

> Not a drum was heard, not a funeral note,
> As his corse to the rampart we hurried;
> Not a soldier discharged his farewell shot
> O'er the grave where our hero we buried.

MOORE, THOMAS (1779-1852), an Irish poet whose name is endeared to all people of his own nationality by his *Irish Melodies,* which stand as the best product of his genius as a poet. He was born in Dublin, educated at Trinity College, and in 1799 went to London to study law, but soon showed his preference for literature. In 1800 he published a translation of *Anacreon,* the Prince of Wales accepting the dedication of the poem. *The Poetical Works of the Late Thomas Little* was his next venture, the name being suggested by his own diminutive stature. He was appointed registrar of the admiralty court in Bermuda in 1803, but tired of the monotonous life, and the next year, after appointing a deputy, returned to England by way of the United States and Canada.

In 1807 he wrote the first of his *Irish Melodies,* which appeal not only to the Irish nation but to the whole Anglo-Saxon race. *Lalla Rookh,* an Eastern romance in verse, was written by the aid of books on Oriental themes. It was published in 1817 and brought its author $15,000, as well as the praise of the whole English-speaking world. In 1809 he went to Italy, but returned to England in 1822 and spent his last years in Wiltshire. His other works include the *Life of Sheridan, Life of Lord Byron, The Epicurean, History of Ireland,* and humorous verses, *The Fudge Family in Paris* and *Loves of the Angels.* His *Song of the Canadian Boatmen* is a lyric that almost sings itself.

MOORS, *moorz,* a name broadly applied to all Mohammedans who speak Arabic and who live in the Barbary states of North Africa. An organized state existed in what is now Morocco as early as 100 B.C. The Arabs overran this country in the seventh and eighth centuries, converting the inhabitants to the Mohammedan religion by force of arms, after a long, strenuous resistance. The Arabs crossed the Mediterranean and passed through Spain into France, where they were stopped at the Battle of Tours in 732, by Charles Martel. They then turned back into Spain, where, with thousands of Moors who came later, they established a powerful kingdom. During the time known as the Dark Ages, while the rest of Europe seemed buried in ignorance and warfare, the learning of the past was preserved and science and art and literature were developed by the Moors in Spain.

Throughout all Europe during this time states were beginning to form about powerful princes who by military force could maintain advantage. Such a prince was Ferdinand of Aragon in Spain, who married the equally powerful Isabella of Castile. Gradually the Moorish kingdom had become limited to Granada, where the Alhambra was their stronghold, and in 1492, while Columbus was sailing westward towards the New World, the armies of Ferdinand and Isabella conquered Granada. Great numbers of the Moors then returned to Northern Africa; those who wished, however, could remain in Spain by changing from the Mohammedan to the Christian religion.

They were then called *Moriscos* by the Spaniards, and any lapse to the old religion was punished with severity. The Inquisition was used as a means of keeping the Moors true Roman

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Catholics. The punishment of the revolt incited by Philip II in 1568-1570 was completed by Philip III, and by 1610 the Moors had all been expelled from Spain. They were among the most vigorous, industrious subjects, and it was a great national misfortune that they were driven out. Those returning to Northern Africa were known as *Andalusians*. They settled in the coast towns, and became, with the other inhabitants, famous pirates, and remained so until the nineteenth century. It was these people who raided United States commerce in the Mediterranean Sea and were checked only when Commodore Decatur was sent against them in 1815 (see DECATUR, STEPHEN).

The present Moors are not, as is sometimes supposed, negroes. They are a white race, showing in swarthy skin and fine features their very mixed blood, for the original inhabitants intermarried with Romans, Arabs and Spanish. They are not well educated, despite their great dignity of manner, and are fanatical Mohammedans, remaining true to the faith of their fathers with all the ancient zeal.

Consult Fitzgerald's *In the Track of the Moors;* Lane-Poole's *The Moors in Spain.*

Related Subjects. The reader is referred to the following articles in these volumes:

Alhambra	Granada
Ferdinand V	Isabella of Castile

MOOSE, the largest member of the deer family, stands from five to seven feet high at the shoulders, and has antlers that sometimes measure over six feet from tip to tip. His home is in the forests of Canada, Maine and Minnesota, and to a lesser extent those of the Northwestern United States. The European elk of Scandinavia, Russia and Prussia is a smaller moose, though the elk of America is a distinctly different animal.

Characteristics. The antlers of the male moose are striking. The fore part of them resembles the horns of a deer, but the branches at the back are united in a spadelike, flat surface, often over a foot wide, from which six to twelve short points protrude like spread fingers from the palm of the hand. The female has no antlers. The upper part of the moose's muzzle hangs flabbily three or four inches over the chin, and aids the animal in browsing for its favorite foods of soft twigs and bark, moss, and the stems and leaves of water lilies. Its front legs are longer than those behind, giving it a clumsy gait and making it necessary for the animal to get on its knees when eating from the ground. It often rears against young trees, bending them over with its weight in order to reach the upper branches.

In the summer moose live in solitude on the shores of lakes and swamps, only the mothers and their young of less than three years being found together. They spend the winter in evergreen forests, several families living together in a space of a few acres known as a *moose yard.*

With all its apparent clumsiness the moose is swift and powerful. It can charge at full

THE KING OF WOODLAND ANIMALS

speed through thickets in which a man has almost to hew his way. It never gallops, but runs with a high step. In spite of restrictions on moose hunting in both Canada and the United States, the animal is in danger of becoming extinct.

"Bull Moose" Party. In 1912 when the National Progressive party was organized in the United States it was popularly called the "Bull Moose Party," because its leader, Theodore Roosevelt, said upon his return home from abroad that he felt as "fine as a bull moose."

MOOSEHEAD LAKE, the largest lake in New England, in Western Maine, forming part of the boundary between Somerset and Piscataquis counties. It is thirty-five miles long and in width varies from one to ten miles. Though it is deep enough for navigation there is only one steamship line, and that is mostly for the accommodation of the many hunters and tourists who come each year for the fine fishing and hunting. Bear, deer and elk are

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found in the great pine forest, and almost every kind of fresh-water fish will rise to the hopeful angler's bait, although the speckled trout, pickerel, pike and bass are most plentiful.

MOOSE JAW, a city in the south-central part of Saskatchewan, one of the most important communities in the Canadian West. It is about midway between Winnipeg and Calgary, on the main line of the Canadian Pacific and on important branches of the Canadian Northern and Grand Trunk Pacific railways. By the shortest rail route Moose Jaw is 300 miles west of Winnipeg and 438 miles east of Calgary. Regina is forty-two miles east of Moose Jaw, and Swift Current is 110 miles west. Moose Jaw was settled about 1883, was incorporated as a city in 1903, and in 1912 adopted the commission form of government. How Moose Jaw got its name is an interesting story. The Indians say that about the year 1860 a pioneer, Lord Dunmore, with his wife and child, camped on the banks of what is now called Thunder Creek. There he mended a broken wheel on his Red River cart with the jaw-bone of a moose, and the Indians afterward spoke of this spot as the place where the white man found the moose jaw. The city has had a remarkable growth; its population increased from 1,558 in 1901 to 13,823 (Dominion census) in 1911. Population in 1916, 16,889.

Moose Jaw is in the heart of the greatest wheat belt in North America, and naturally receives and ships millions of bushels a year. It has one of the three large interior storage elevators (capacity 3,500,000 bushels) owned by the Dominion government, and also a number of privately-owned elevators. Moose Jaw's flour mills have a daily capacity of 5,000 barrels and are among the chief industrial establishments. Leading industries are slaughtering and meat-packing and the manufacture of war munitions. The Canadian Pacific Railway in its local yards and shops employs about 2,000 men. Moose Jaw is important also as a wholesale center, and is a distributing point for a territory whose radius is 200 to 300 miles.

The city has a large number of attractive buildings, both public and private. Noteworthy are the post office, erected in 1915 at a cost of $300,000; the armory, completed in 1914 at an expense of $150,000; the public library, and the Young Women's Christian Association. Worthy of special mention among the business blocks are the Hammond Block and the Walter Scott building. Other conspicuous structures are the collegiate institute, Saint Andrew's Presbyterian Church, Zion Church (Methodist), the land titles building, the general hospital and Saskatchewan College, a residential school for boys. Crescent Park, River Park and River Drive are attractive features. Moose Jaw is especially fortunate, for a prairie city, in having opportunity for boating and bathing, and its aquatic club is stimulating interest in water sports. Thus Moose Jaw River, though of no commercial importance, adds greatly to the enjoyment of the citizens. The city owns and operates its electric light and power plant and its water works. Water is piped from Caron Springs, a distance of twenty-two miles. For fire protection a high-pressure system was installed in 1913. Moose Jaw's electric street railway was the first in Saskatchewan. W.F.H.

MOOSE RIVER, one of the large streams which drains Northern Ontario into Hudson Bay. It is formed by the confluence of the Mattagami and the Missinaibi, the former being considered the main stream. The Moose proper, from the confluence to its mouth at the southern end of James Bay, is seventy-five miles long, but from the head of the Mattagami to the mouth of the Moose is a distance of 340 miles. About thirty-five miles from its mouth the Moose receives another large stream, the Abitibi, which is also 340 miles long and has its sources east of the Mattagami. These streams, with their tributaries, spread out in the shape of a fan, and drain nearly the whole of the Timiskaming district. The area of this drainage basin is 42,100 square miles. Moose Factory, a famous post of the Hudson's Bay Company, is on the Moose River near its mouth.

MOOSOMIN, *moo'so min,* a town in southeastern Saskatchewan. It is on the main line of the Canadian Pacific Railway, eighty-seven miles west of Brandon, about twelve miles west of the Manitoba boundary, and 138 miles east of Regina. Moosomin is one of the older towns in the Northwest; it was incorporated as a town in 1889. It has a land titles office, customs office and provincial jail, and is the seat of a judicial district and a district headquarters of the Royal Northwest Mounted Police. It also has a normal school, a school of music and a collegiate institute in addition to the regular public schools. The region surrounding Moosomin is noted as a mixed farming district. Population in 1911, 1,143; in 1916, about 1,400.

MORAINE, *mo rain',* a mass of rock and gravel carried by a glacier and deposited at its lower end. The rocks and gravel are gathered

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as the glacier moves down the valley until they form regular walls along the sides. These are called *lateral* moraines. Others, near the middle of the glacier, are *medial* moraines, and the mass deposited at the end forms the *terminal* moraine, which continues to increase in size as rocks and gravel are added to it from year to year. Some of the moraines of the Glacial Period are so large that they form ranges of hills. See GLACIER; GLACIAL PERIOD.

MORALITY, *mo ral' i ti,* **PLAY,** a drama in which the characters personify abstract ideas, such as virtue, vice, wealth, poverty, knowledge, ignorance, innocence, jealousy, etc. These plays were first produced in England in the fifteenth century and, with the *miracle* and *mystery* plays, all growing out of Church pageants, gave rise to modern drama. They were meant to teach a needed reform and were sometimes a bit dull. The vices, better understood by humanity than the virtues, played many tricky pranks and furnished, indeed, the humorous element. The clowns and fools, superbly created by Shakespeare, were a development of the vices of the morality play.

Ben Greet and his company of English players revived, in 1902-1903, one of the best old morality plays, *Everyman.* It first appeared in the fifteenth century; the author is unknown. The two best modern morality plays are *Everywoman,* written by Walter Browne in 1911 in the style of *Everyman,* and *Experience,* written by George Hobart and produced in 1914.

Related Subjects. The following articles in these volumes may well be read in this connection:

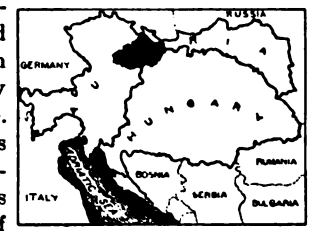
Drama	Miracle Play
Literature	Mystery Play

MOR'ALS COURT. The brotherly spirit of helpfulness of the modern age has found concrete expression in many ways. The social settlement and the juvenile court are among the agencies developed within recent years for the uplift of the weak, the unfortunate or the vicious, and to these has been added the morals court, for the trial of persons charged with offenses classed as vice.

The first morals court in the world was established in Chicago, Ill., in 1913, and other cities at once watched its career with interest. It coöperates with vice and public morals commissions, working with them to free cities from the terrible effects of vice and immorality, to trace evil to its sources and to reclaim those who have yielded to debasing influences. The accused finds himself in an atmosphere of sympathy rather than of censure, for social workers, nurses and investigators are present to advise and aid those brought to the court for trial. These trials are not open to the general public, but statistics and records of cases are compiled and made available for social investigators. The sponsors of this institution look forward to the time when hospitals for the treatment of the sick and other helpful agencies will be maintained in connection with the morals court. It is even now opening the way for wiser and more kindly handling of moral offenses, and its administration is tangible evidence of the reality of the spirit of universal brotherhood.

The second morals court in the world was instituted in New York City in 1915. In both Chicago and New York the presiding judge was selected from the large number of judges of the regularly-constituted courts.

MORAVIA, *mo ra' vi a,* a rich, northwestern crownland of Austria-Hungary, ruled by a margrave, or governor, and an assembly known as the diet. The country, which has an area of 8,584 square miles, is a plateau surrounded by hills and mountains and drained by the March River, a tributary of the Danube. The climate is mild and healthful. Moravia lies within the zone of the great War of the Nations (which see), and in the Carpathian Mountains, on the east, have been fought some of the fiercest battles of history.



LOCATION MAP

Three-fourths of the inhabitants are Slavs, and nearly one-fourth are Germans. The language spoken is a corrupt form of German. The principal occupations are agriculture and stock raising, mining and manufacture. Moravia is especially noted for the manufacture of woolen goods. Large flocks of sheep supply the wool for this industry. The cultivation of cereals, such as wheat, oats, rye, barley, corn and flax, is superior to that of most of the other provinces of Austria-Hungary. Great quantities of sugar beets are grown for the making of beet sugar. Leather goods, yarn, silk, wine, glass and machinery are made in Moravia, and with woolen goods and sugar are the principal exports of the province.

The Moravian Church was organized in Moravia and Bohemia under the leadership of John Huss (which see). It is noted for its missionary

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work in such distant places as Alaska and Greenland, and among such unfortunate beings as lepers. Few of this sect are to be found in Moravia; the greater part of the inhabitants are at present Roman Catholics. The capital and largest city is Brunn, which has a population of nearly 126,000. In 1912 the crownland had an estimated population of 2,651,300.

MORAVIAN BRETHREN, a Protestant sect or Church which arose in Moravia and Bohemia after the death of John Huss, a Bohemian reformer (see HUSS, JOHN). The first church was established in 1722 by Count Nicholas Zinzendorf at Herrnhut, which means "The Lord's Watch." Moravian refugees came to America in 1735 and settled at Savannah, Ga., but in 1740 removed to Pennsylvania and founded a settlement in Northampton County, on the Lehigh River. They were so energetic that in three months they cleared the ground, built log houses and purchased 500 acres of additional land. Other pioneers came, and on Christmas Eve of that year they celebrated the Lord's Supper and sang a hymn beginning:

> Not Jerusalem; lowly Bethlehem
> 'Twas that gave us Christ to save us.

So moved were they by this hymn that by common consent they called the place Bethlehem, and the church at this place is the mother of all Moravian churches in America.

The entire body of Moravians is organized into three provinces, German, English and American, the Church being governed from Herrnhut in Saxony by a general synod which meets every ten years. In the United States the total number of communicants is about 21,000, and there are about 140 churches. Moravians are zealous in missionary work and noted for earnest piety. Their religion does not differ from that of other Protestant churches in main points of Christian doctrine.

MOR'DANTS, the name given to compounds which unite chemically with dyestuffs to produce a permanent color, especially in the dyeing of wool and silk goods. In some cases, however, as in lake dyes, the action is mechanical rather than chemical. The chief mordants are solutions of iron, aluminum and tin salts and tannic acid. Calico patterns are first printed with a mordant which will combine with the proper color when immersed in the dye, leaving the rest of the cloth unaffected.

MOR'DEN, a town of Manitoba, situated in Lisgar County, on Dead Horse Creek and on the Canadian Pacific and Great Northern railways, eighty-two miles southwest of Winnipeg. The chief manufactures are flour, lumber and machinery. The town contains a number of grain elevators. Morden is the center of the southern judicial land titles and surrogate court districts. Among its public buildings are a fine post office, completed in 1915, a courthouse and jail of the most modern type, erected at a cost of $35,000, a hospital and nurses' home. A 320-acre Dominion experimental fruit farm is near by. The town owns its electric light plant. Population in 1911, 1,130; in 1916, about 1,500.

MORE, SIR THOMAS (1478-1535), a lord chancellor of England and the author of the celebrated *Utopia.* Educated at Oxford, he entered Parliament and quickly showed an independent spirit by opposing certain grants of money to Henry VII. His scruples cost him the royal favor, and he left Parliament not to return to public life until the accession of Henry VIII.

More sympathized cordially with the tolerant attitude which the new king adopted towards the Roman Catholic Church, and this fact, together with his conspicuous gifts, marked him for a post of authority. On the fall of Wolsey, he became chancellor, a post he continued to fill until growing friction with his royal master led him to resign the office. He could not conceal his disapproval of Henry's treatment of Catharine of Aragon (which see), neither was he prepared to accept the king's rupture with the Church of Rome—a rupture brought about by the refusal of the Pope to sanction the divorce from Catharine. The king's vengeance pursued More into private life. He was charged with high treason and cast into the Tower of London. His eloquent plea in defense of his acts was unavailing, and he met death on the scaffold with characteristic fortitude on July 6, 1535.

More knew and was esteemed by the most eminent men of his generation, including the great Erasmus. The nobility of his spirit lives for us to-day in the *Utopia,* a stirring vision of an ideal commonwealth that has inspired many later humanitarian dreamers.

MORELIA, *mo ra'lyah,* the capital of the state of Michoacán, Mexico, situated about 130 miles northwest of the city of Mexico, and 6,314 feet above sea level. Valladolid was the original name of the city, but in 1828 it was changed to Morelia, in honor of Morelos, a Mexican patriot and soldier. There are many impressive public buildings, cathedrals and libraries, the aggregate number of volumes in the latter being estimated at 70,000. Cotton and woolen goods, palm hats, sugar, pulque and

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cheese are manufactured, and the city also produces a high-grade candy from the fruits of the district. Population, 1910, 40,000.

MORGAN, Sir Henry (1635-1688), an English buccaneer, or sea robber, who ravaged a great part of tropical America. He was born in Llanrhynny, Wales, and at an early age shipped as a sailor for Barbados, from there working his way to Jamaica, where he joined the crew of a pirate vessel. By 1663 he was master of his own ship and was sent to Cuba by the lieutenant-governor of Jamaica, soon acquiring fame by daring attacks on Central America and West Indian towns. He captured Maracaibo in 1669 and put the inhabitants to torture, and a year later ravaged the coasts of both the mainland and Cuba. .In 1671 he plundered the city of Panama, and then returned to Jamaica. After peace had been declared between England and Spain in 1672 he was sent a prisoner to England, but managed to secure vindication for his acts, and in 1674 was sent back to Jamaica as commander-in-chief of the British forces in the colony.

MORGAN, John Hunt (1825-1864), an American military commander, leader of a company of Confederate soldiers known as "Morgan's Raiders," who figured in many daring expeditions during the War of Secession. He was born in Huntsville, Ala. During the war with Mexico he served under General Taylor, with the rank of lieutenant, but joined the Confederate army on the outbreak of the War of Secession. In this conflict he attracted wide notice as captain of a band of volunteer cavalry, when he began a series of raids which destroyed public property, railroad trains, military supplies and bridges. A spectacular "Christmas Raid" in Kentucky, in 1862, won him a vote of thanks from the Confederate Congress.

The following year, hoping to draw off General Rosecrans from his Tennessee campaign, Morgan crossed the Ohio River and devastated several towns in Ohio and Indiana. Driven out of these states, he attempted to join Lee in Pennsylvania, but in July, 1863, was captured and placed in the penitentiary at Columbus, O. The following November he escaped and resumed his career of guerrilla warfare, but was defeated in Kentucky. Having retreated to Greenville, Tenn., he was surrounded by Federal troops while resting in a farmhouse, and was shot while attempting to escape.

MORGAN, John Pierpont (1837-1913), the greatest financier that America has produced. He was born at Hartford, Conn., received an excellent education in the English High School of Boston and at the University of Göttingen, Germany, and at twenty began work in a banking house in New York City. He early perceived great opportunities for a banking system that could finance the vast industrial projects of America, and from the time he became a member of Drexel, Morgan & Company in 1871 his chief aim was the perfecting of such a system. He ultimately reorganized the above firm into the house of J. P. Morgan & Company, and aided more than any other man in America in giving financial strength to railways and in consolidating industrial corporations. His executive ability and his credit were such that he was intrusted with the complete sale of the $62,000,000 United States bond issue during Cleveland's administration, was given entire charge of American subscriptions to the British war loan of $50,000,000 in 1901, repeatedly aided in the financial affairs of China and Japan, and organized and disposed of the complete securities of the United States Steel Corporation, amounting to $1,100,000,000. During the last year of his life his policies were severely criticized by Congressmen and other government officials, and the resulting inquiry seemed to increase a nervous trouble with which he was afflicted. He went for rest to Rome and died there very suddenly.

J. PIERPONT MORGAN

His gifts to education and charity were large, among them being $1,500,000 to the Lying-In Hospital in New York, large amounts to trade schools and to the Cathedral of Saint John the Divine of that city, frequent sums of money to the University of the South at Sewanee, Tenn., and numerous valuable pictures, statues, books and specimens to American libraries and museums, especially the Metropolitan Museum of Art, New York City, to which he gave works valued at more than a million dollars.

John Pierpont Morgan (1867-), son of the above, was born in New York and educated at Harvard University. After being graduated from Harvard he entered the firm of J. P. Morgan & Company, New York, and the firm of Morgan, Grenfell & Company, London. He

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became a stockholder and director in many large corporations. At his father's death he inherited most of the estate and filled numerous positions that had been occupied by J. P. Morgan senior. In 1914 he was made the official British representative for placing contracts in the United States for the manufacture of munitions during the War of the Nations. In 1915 he organized a syndicate to float a loan of $500,000,000 to England and France.

J. P. MORGAN
Present head of the powerful banking firm established by his father.

MORGAN, JOHN TYLER (1824-1907), an American lawyer and statesman of the South, notable for his services as United States Senator from Alabama for thirty years. During his Senatorship he was recognized as one of the ablest of Democratic leaders, and for some years was chairman of the Senate committee of foreign relations. He was also chairman of the commission on interoceanic canals, a member of the board of arbitration concerning the Bering Sea fisheries, and one of the commission appointed by President McKinley to organize a government for the Hawaiian Islands. He was renowned for his speeches made in behalf of Cuban independence.

Although a native of Athens, Tenn., Morgan received most of his education in Alabama and began the practice of law at Talladega in 1845. He served as a member of the state convention that passed the Ordinance of Secession in 1861. Joining the Confederate army as a private, he was promoted to the rank of brigadier-general. After the war he resumed the practice of law at Selma, and after serving twice as Presidential elector was elected to the Senate for five successive terms.

MORGANATIC, *mor ga nat'ik,* **MARRIAGE.** See subhead, in article MARRIAGE.

MORGANTOWN, W. VA., the county seat of Monongalia County, situated on the Monongahela River, near the northwest state boundary line. It is on the Baltimore & Ohio and the Morgantown & Kingwood railroads, and is fifty miles southeast of Wheeling, sixty miles south of Pittsburgh and about 100 miles by rail from both cities. River commerce extends to Fairview, twenty-six miles southwest of Morgantown. The area of the city is three square miles. The population, which in 1910 was 9,150, was 13,709 (Federal estimate) in 1916.

Morgantown is the seat of the University of West Virginia (which see), with an attendance of 1,700 students, and besides the noteworthy buildings of the campus, which include a fine library, armory and mechanical hall, the city has a Federal building, completed in 1915 at a cost of nearly $100,000, and a number of attractive churches. Cheat River, a few miles distant, is a stream of much scenic beauty. The city has valuable natural resources consisting of timber, natural gas, coal, iron, limestone, clay and glass sand; and it manufactures sheet and tin plate, window glass, pressed prism glass, wire glass and mirrors.

A settlement made here in 1768 by David and Zackwill Morgan was named in honor of the latter, incorporated in 1785 as Morgan's Town, and became a city in 1905. J.A.P.

MORIN, *moraN',* AUGUSTE NORBERT (1803-1865), a Canadian jurist and statesman, for a quarter of a century one of the most conspicuous Liberals of Quebec, twice Premier of Canada under the Union Act of 1841. Morin was born at Saint Michel, Que., received his schooling at the Quebec Seminary, then studied law, and in 1828 was called to the bar. Two years later he was elected to the Quebec assembly, in which his talents won immediate recognition, so that in 1834, when commissioners were sent to London to inform the British government of political conditions in Canada, Morin was chosen one of the commissioners.

After the Union of Upper and Lower Canada, he was elected to the Canadian assembly. He became a prominent follower of Lafontaine and Baldwin, in whose first Ministry he was commissioner of crownlands (1842-1843). Reëlected to the assembly in 1844, he served as a private member until 1848, and as speaker from 1848 to 1851. Throughout the long struggle for responsible government, Morin labored faithfully for reform. His high standards, his ability and his experience gave him a respected position among Canadian public men, and on the retirement of Sir Louis Lafontaine Morin was chosen to succeed him as leader of the Lower Canada Liberals. He joined with Sir Francis Hincks in 1851 to form a Ministry, which held office until 1854, when it was defeated because of the delay in disposing of the questions of clergy reserves and seigniorial tenures. Morin resigned, but so strong still was his influence that he was able to form a coalition Ministry, the MacNab-

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Morin administration, for the express purpose of carrying through the long-delayed reforms. In 1855, shortly after the changes were made, Morin resigned on account of failing health, and accepted the less arduous position of a judge of the superior court of Quebec. He remained on the bench until a few months before his death.

MORLEY, HENRY (1822-1894), an English essayist and editor, born in London. He was educated at a Moravian school in Germany and at King's College, London, and, after practicing medicine a brief time, established a school on Moravian methods at Manchester and later at Liverpool. Some ironical papers, entitled *How to Make Home Unhealthy,* received favorable attention from Charles Dickens and he induced Morley to aid him in editing the magazine, *Household Words.* From that time his energies were devoted to writing and editing, among his most successful works being *Lives, A Defense of Ignorance, English Writers* (11 volumes), *A First Sketch of English Literature* and *English Literature in the Reign of Victoria.* He edited a library of *English Literature,* the famous *Universal Library* and *Cassell's National Library.* As a critic and a scholar he was defective, but he had excellent taste and the knack of popularizing scholarly subjects.

MORLEY, JOHN, First Viscount Morley of Blackburn (1838-), an English author and statesman, born at Blackburn, Lancashire. He was graduated from Oxford, and in 1859 was admitted to the bar. Soon afterward he entered on a long period of professional authorship, serving successively as editor of the *Literary Gazette,* the *Fortnightly Review,* the *Pall Mall Gazette* and *Macmillan's Magazine.* In the meantime he produced an excellent *Life of Edmund Burke* and a *Life of Richard Cobden.* In 1883 he was sent to Parliament, and three years later was made secretary for Ireland under Gladstone. He was several times reëlected to the House, and distinguished himself as one of the leaders of the liberal party. Under Sir Henry Campbell-Bannerman he was in 1905 made secretary of state for India, and this post he retained under Asquith, being transferred, however, in 1908 from the House of Commons to the House of Lords, as Viscount Morley of Blackburn. He was Lord President of the Council for three years, resigning in 1914. Among his works, besides those named above, are *Voltaire, Rousseau, Diderot and the Encyclopaedists; Oliver Cromwell,* and an unusually sympathetic *Life of Gladstone.* His *Life of Burke* appears in the "English Men of Letters" series, of which he was chief editor.

JOHN MORLEY
(Viscount Morley of Blackburn.)

MORMONS, *mawr'munz,* officially called THE CHURCH OF JESUS CHRIST OF LATTER-DAY SAINTS, is a religious sect founded by Joseph Smith in 1830 and now numbering over 500,000 adherents in various parts of the world. A majority of the members live in Utah, which is practically a Mormon state, but there are large numbers in Idaho, Wyoming, Colorado, Arizona and other states. Prosperous Mormon colonies have been established in Mexico, the Sandwich Islands, Australia, New Zealand and Canada. Some Mormons live in every civilized nation on the globe.

Doctrines of the Church. The Mormons, it must be understood, are a Christian sect. They believe in God and Jesus Christ, and in Joseph Smith, as a modern Prophet. They believe that God sent no message to man from the time of Christ and his apostles until his revelation to Joseph Smith. The Bible is accepted as the gospel, but is supplemented by the Book of Mormon and by revelation through the president of the Church.

The salvation of man is possible, according to Mormon doctrine, only through belief in Christ's atonement, repentance for sin, and baptism for the remission of sin. Baptism is by immersion and is the necessary preparation for the Holy Ghost, which is received through the laying-on of hands by the duly authorized priesthood of the Church. The Mormons also believe that all baptisms from the days of Christ's apostles to the time of Joseph Smith are void. Friends of the dead, however, may be baptized in their stead, and in this way George Washington, Benjamin Franklin and others have been received into the Church. Infant baptism is not practiced, Mormons considering the age of accountability as eight years, when they are baptized.

The Mormon beliefs in regard to marriage have been more widely discussed and misunderstood than any other feature of their creed. According to the revelation on this subject, all

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marriages on earth without divine authority are ended by death. On the other hand, if marriage is accompanied by the ceremony of *sealing,* by an authorized member of the priesthood, a man and woman are wedded for all eternity. This term is taken from the closing words of the marriage ceremony as performed by the Prophet Joseph Smith and his successors: "All these blessings, together with all other blessings pertaining to the new and everlasting covenant, I *seal* upon your heads, through your faithfulness, etc." A man may be sealed to any number of women, but a woman may be sealed to only one man. As in baptism, marriage and sealing may be by proxy, in order to assure salvation to men and women who have left this world still unsealed, but are not to blame for this fact.

The Book of Mormon contains a strong denunciation of polygamy, with a permissive clause, however: "For if I will," saith the Lord of Hosts, "Raise up seed unto me I will command my people; otherwise they shall hearken unto these things" (Book of Mormon, Jacob, Chapter 11, v. 30). Plural marriage is now abandoned in practice. But for nearly forty years polygamy was the exception rather than the rule; only three per cent of the men accepting the difficult rule. Brigham Young, in 1852, publicly announced the revelation on the subject of plural marriages, which had been given in private by the Prophet in 1843. According to this revelation, the saints, when they leave earth, are deified, and their business in Heaven, the perpetuation of family life, is the propagation of souls to occupy the bodies of people born on various earths, being a part of their glorification. The glory of a saint in Heaven is in proportion to his intelligence, his obedience to law and to his experience on earth. The marriage of one man to a number of women on earth purifies, through continence, sobriety, and affection, the man and the women, making possible the bringing onto the earth of a better race of children, at the same time making for the creation of enough bodies for the thousands of disembodied spirits which are awaiting pure and wholesome incarnation. The contradiction between this revelation and the present practice is explained by Mormon scholars as due to the laws of the United States which prevent the saints from carrying out the commands received through revelation, but as the saints have tried to obey they will not be punished for their apparent failure to heed these commands.

Church Government. At the head of the Church is the president, who is the successor of Joseph Smith. Associated with him are two counselors. These three, who are declared to be the successors of Peter, James and John, constitute the *first presidency,* in the priesthood of Melchisedek, and thus preside over the whole Church. Below them rank the patriarch, whose function it is to bless and lay on hands, and the Twelve Apostles, who are a high council of the Church; and in case of the death or disability of the president they exercise his powers. These high officials, together with the elders and high priests, comprise the priesthood of Melchisedek. The subordinate priesthood of Aaron includes the priests, teachers and deacons. The Church is divided into about fifty *stakes,* nearly half of which are in Utah. Each stake is divided into wards, and each ward into districts, each of which has its meeting-house, Sunday school, Woman's Relief Society and social organizations.

History of the Mormon Church

The Revelation to Joseph Smith. According to Joseph Smith it was on the night of September 21, 1823, that the angel Moroni appeared to him and told him that a book containing the history of the ancient inhabitants of America was buried in Cumorah Hill, about four miles from Palmyra, N. Y. The next day Smith went to the hill and found the book, but the angel told him the time to remove it had not yet come. Not until four years later, on September 22, 1827, did the angel allow Smith to take the book. It was written in strange characters on golden plates, and the volume was closed with three clasps. Each plate was nearly eight inches long by seven inches thick, but a part of it was sealed, and only the unsealed part was revealed to Smith at that time, the rest being reserved for future revelations.

The next two years were devoted chiefly to the translation of the characters, which were in "reformed Egyptian." With the book he had received a pair of spectacles, two transparent crystals set in a silver bow, by the aid of which he could translate the characters. Smith sat behind a curtain and read aloud his translation, while his wife, with Martin Harris and Oliver Cowdery, wrote down his dictation. These, with Smith's father and two brothers

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and three other witnesses, later solemnly testified that they had seen the plates. When the translation was completed, Martin Harris, a farmer, supplied the money to print the book, and an edition of 5,000 copies was prepared and offered for sale in 1830, at $1.25 a copy.

The Book of Mormon. This was the name chosen from the title-page, which was given on the plates, "The Book of Mormon: An account written by the hand of Mormon upon plates taken from the plates of Nephi." Mormon was the last of the prophets upon the American continent, and he gave the plates to his son Moroni, who hid them in the hill of Cumorah, about 1,400 years before they were delivered to Joseph Smith, on the eve of the last battle between the Nephites and Lamanites.

The Book of Mormon purports to be a history of America from its first settlement until the beginning of the fifth century of the Christian Era. According to this account the first settlement was made by a colony of Jaredites, who were driven from the Tower of Babel to America. The Jaredites, in the course of centuries, killed one another off, and about 600 B.C. a new colony was founded by one Lehi, his wife, his four sons and twelve friends, all of whom came directly from Jerusalem and landed on the coast of Chile. After his death his youngest son, Nephi, was divinely appointed to succeed to his leadership. At this evidence of divine favor his brothers were angry, but they were promptly punished for their show of jealousy by being turned into a dark-skinned, idle people called *Lamanites*. From them, the narrative states, sprang the North American Indians.

According to the story, the Nephites, or good Hebrews, gradually fell away from the true faith, in spite of the intercession of Christ, who appeared in America after his resurrection. Finally, the Nephites were practically annihilated by the Lamanites in a great battle at the hill of Cumorah, in 384 B.C. Among the few who escaped were Mormon and his son, Moroni. Mormon preserved the records of his people, and Moroni added an account of events within his own memory. This book of records he buried on the hill of Cumorah, with the divine assurance that God's chosen prophet would some day discover it.

Organization and Growth of the Church. With the Book of Mormon as their authority, Joseph Smith and five others organized a church at Fayette, Seneca County, N. Y., on April 6, 1830, and within a short time were sending forth missionaries in all directions. In 1831, guided by a revelation, Smith decided to move to Kirtland, Ohio, and in the same year the Mormons founded a colony at Independence, Mo., which latter was to become the New Jerusalem. In 1835 the Twelve Apostles, including Brigham Young, were chosen. Meanwhile, from the beginning the Mormons had been steadily persecuted, and the Missouri colony, after being driven out of two localities, was finally assigned to a thinly-settled region, now part of Caldwell County, where was built the town of Far West. Affairs in Kirtland had not prospered, and there were disputes with the state authorities because the Kirtland Safety Society Anti-Banking Co., controlled by some of the Mormons, had failed. There was also dissension within the Church, for a strong faction tried to remove Smith from the leadership.

Early in 1838 Smith left Ohio for the Mormon settlement at Far West, Mo. Here, however, the Mormons were already in difficulties with their gentile neighbors. From threats and quarrels they came to blows, from blows to rioting, and from rioting to a state of civil war. The climax came in the autumn of 1838, when a company of militia murdered about twenty Mormons at Hawn's Mills. Smith and Sydney Rigdon, one of his counselors, were later arrested and imprisoned for murder, felony and treason. Most of the Mormons, then about 15,000 strong, crossed the Mississippi River into Illinois, where they founded the town of Nauvoo. Smith and Rigdon managed to escape from prison, and rejoined their followers in Illinois.

At Nauvoo the Mormons were welcomed by the leaders of the great political parties and were given a special charter for the city. Here the question of polygamy arose, for it became generally known that Smith was living with several wives and was about to announce a revelation on the subject of "celestial" marriages. A number of bitter apostate Mormons, who were indignant at Smith's conduct, established the Nauvoo *Expositor* for the purpose of opposition and persecution. Only a single number (June 7, 1844) appeared, and it was filled with calumnies of women and tirades against the Prophet and the orthodox Mormons. The city council declared the paper a public nuisance, and three days later the plant was destroyed by the city officials. This led to a general uprising of the gentiles against them, while Joseph Smith, his brother Hyrum and

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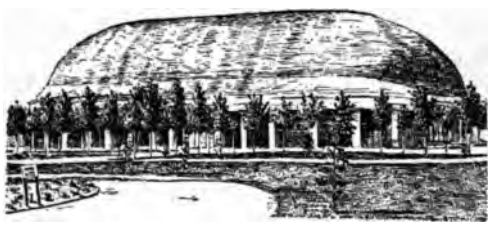
others were arrested on June 25, 1844, on a charge of treason, and were imprisoned at Carthage. Two days later a mob, without meeting any resistance from the guards, invaded the jail and shot the two brothers.

The death of Smith eventually led to divisions in the Church, the body of the members accepting the leadership of the Twelve Apostles with Brigham Young at their head, as Joseph Smith's successor, while another small faction maintained that young Joseph Smith, son of the Prophet, should be his successor. One faction followed Strang and settled on Beaver Island. Prosperity for the Church in Illinois was at an end, and in 1845 the Mormons agreed to leave the state. Led by Brigham Young, they began their westward migration in the next year, and in September, 1848, the first settlers arrived at the new chosen site on the shores of Great Salt Lake in Utah. Brigham Young planted the Stars and Stripes on entering the valley of the Great Salt Lake in July, 1847, and took possession of the then Mexican soil in the name of the United States government.

The Mormons in Utah. Though differences of opinion may exist as to the doctrines or practices of the Mormon Church, there can be only one verdict as to their work in Utah. Here, if ever, the prophecy of Isaiah (XXXV, 1) was fulfilled: "The desert shall rejoice and blossom as the rose." At first there was suffering from lack of food, clothing and shelter, but soon there was abundance. The discovery of gold



MORMON TABERNACLE, SALT LAKE CITY

in California, followed by the stream of gold seekers who made Salt Lake City a stopping place, brought prosperity. Mormon settlers arrived from all parts of the United States, several thousand came from England, and by 1852 there were about 30,000 Mormons in the valley of Great Salt Lake.

For a number of years there was conflict between the United States government and the Mormons. The latter applied for admission to the Union in 1849 as the "State of Deseret," but met with refusal. Utah, however, was organized as a territory in 1850, and Brigham Young was governor for seven years. He proved an able leader. The colony flourished, agriculture being its main support. The United States is indebted to Brigham Young for the introduction of irrigation in modern times, the Mormons proving that irrigation would produce rich crops on the soil of the American "desert." In 1857 the government sent troops to Utah, partly to get Johnston's army out on the frontiers in case of civil war, and partly because of false rumors carried to Washington. During the War of the Secession the Mormons were loyal. The first overland telegram was sent by Brigham Young to Abraham Lincoln in 1861, "Utah is loyal. Has not seceded from the Union." Later the hostility between the Church and the Federal government gradually declined. The spread of polygamy, however, caused new conflicts, and it was not until 1890 that the president of the Church advised members to refrain from polygamous marriages. The Reorganized Church of Jesus Christ of Latter-Day Saints, which was established because Young openly introduced plural marriages, has always opposed polygamy.

Taken as a body, the Mormons are temperate, industrious people. They do not use tea, coffee, tobacco or strong drink, nor are they addicted to profanity. There is no poverty among the Mormons; the Church is rich and is supported by tithes, which should be contributed by every devout member; the tithe is the ancient law of Israel, that one-tenth of the increase should be devoted to the Lord's work. The Great Temple in Salt Lake City is a striking witness to their thrift and their faith. This beautiful and imposing structure cost $4,000,000 and took forty years to build, the great granite blocks being drawn by ox teams from the quarries in the mountains twenty miles distant. There are three other temples in Utah, one in Logan, one in Manti and the other in Saint George. Two temples are being erected at the present time, one in Canada and one in the Sandwich Islands. These temples are erected for vicarious work for the dead, such as baptism, marriages, etc. On the Temple Square in Salt Lake City there are two other edifices, the tabernacle, noted for its magnificent pipe organ, and having a seating capacity of 10,000, and the smaller Assembly Hall. These buildings constitute the official seat for the conferences held by the Mormon Church. M.M.B.

Consult Shook's *The True Origin of Mormon Polygamy;* Talmage's *The Story of Mormonism.*

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The above are pro-Mormon. For anti-Mormon works consult Nelson's *Scientific Aspects of Mormonism*; Wilson's *Outlines of Mormon Philosophy*.

MORNING-GLORY, the common name of the hardy *Convolvulus,* a family of many varieties of climbing plants, having velvety, funnel-shaped flowers of variegated colors, and shades of purple, blue, pink and white. These fra-

Wondrous interlacement!
Holding fast to threads by green and silky rings,
With the dawn it spreads its white and purple wings;
Generous in its bloom, and sheltering while it clings,
Sturdy morning-glory.
—HELEN HUNT: *Morning-Glory.*

grant blossoms are full blown in the morning, but cannot endure direct sunlight; the blossoms close soon after sunrise, to open again at the next dawn of day. The vine has a dark-green heart-shaped leaf, and grows at an astonishingly rapid rate, twining itself about anything near it and growing from ten to twenty feet high. It is extensively cultivated in country gardens, and as a screen to adorn fences, posts and verandas. In regions where it has been allowed to run wild, it is known as *bindweed.* The Japanese hold the plant sacred and have cultivated it to a marvelous degree of beauty, increasing its size and the number of its colors and shadings.

MOROCCO, *mo rok'o,* a country occupying the northwest extremity of Africa, one of those backward parts of the earth that, after centuries of despotism and disorder, are permitting the European to set their house in order. Of recent years Morocco has been in the public eye because of the sharp rivalry among European nations for promising colonies. It touches Algeria on the east and is bounded on the north and west by the Mediterranean Sea and the Atlantic Ocean. On the south it reaches the Spanish Gold Coast and the wastes of the Sahara, in which its limits are not sharply defined. It comprises approximately 219,000 square miles, an area less than that of Texas or Saskatchewan.

The People and Their Surroundings. The population of Morocco is generally estimated at 5,000,000. There is almost no industry, though cattle, hides, wool, barley, wheat, eggs, almonds, flaxseed, beans and some other products are exported. In agriculture the most primitive of methods and implements are employed. The country is crossed from northeast to southwest by parallel chains of the Atlas Mountains. Though much of it is unsuited to cultivation, there are vast areas on the table-lands between the mountains and the sea that would be very productive if properly tilled. Pierre Loti calls Morocco an "empire carpeted with flowers," and Burton Holmes relates that the road from Tangier to Fez lies between "interminable beds" of wild flowers of every color. Most of this land lies fallow while the native Berbers cultivate the less productive soil in the slopes of the mountains. The Berbers constitute the most numerous part of the population and are to be found chiefly in the mountains, a rude and hardy stock. The plains are inhabited by the Arabs and the Moors, a people of mixed Berber and Arabic blood, and Arabic culture. In the towns the most energetic and progressive element is Jewish, which now has in its hands most of the foreign trade. The chief towns are Fez, the capital (140,000), Tangier (35,000), and Morocco.

LOCATION MAP

At one time the Moroccans manufactured beautiful stuffs of silk and wool, but this traditional industry has almost disappeared. But little of the morocco leather with which we bind our best books is now prepared in Morocco. The people raise wheat, barley and maize, but subsist chiefly on millet. The climate is delightfully mild and fruits of Southern Europe are abundantly grown. The interior contains rich deposits of lead, iron, copper and antimony; silver and gold are supposed to abound also, but the hostility of the tribes has prevented European development.

Government. Until recently Morocco was technically a sultanate. The sultan ruled as a despot, recognized as the chief of the state and the head of the religion, which is Mohammedan. As in most despotisms, anarchy flour-

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ished. Taxes were arbitrarily imposed and ruthlessly collected. The system of justice was deplorable. Now however, France, hoping to incorporate Morocco in her vast African Empire, has established a protectorate over most of the country, and has induced the sultan to countenance certain administrative and financial reforms. A military police with French officers has been organized. Germany and Spain for a time opposed French domination, but in 1911 Germany abandoned her claims in return for the cession of a part of French Congo, and Spain has been given a protectorate over the Mediterranean coast. A space of 140 square miles about Tangier, the port opposite Gibraltar, is internationalized.

History. Morocco in ancient times formed part of the Roman province of Mauretania, and when Rome's power declined, it experienced the vicissitudes of the other African provinces. It was overrun by the Arabs in 682, reduced to submission and forced to adopt the Mohammedan religion. The chief dynasties in the centuries that followed were the Almoravides and the Almohades. It participated in the conquest of Spain, and during the latter part of the Middle Ages, when the Moorish power began to weaken, it was largely from Morocco that fresh contingents were drawn for service in Spain. When the Moors were finally driven from Spain after the fall of Granada in 1492, many of them settled in Morocco. In 1814 the slavery of Christians was abolished, and the piracy which had led to constant friction with European powers was prohibited three years later. The invasion of Spanish territory by lawless bands resulted in a war with Spain in 1859. By the terms of peace Morocco lost territory and was forced to pay an indemnity of $20,000,000.

Consult Finnemore's *Morocco;* Edwards' *The Barbary Coast.*

Related Subjects. The reader is referred to the following articles in these volumes:

Arabs	Moors
Barbary States	Morocco
Berbers	Sultan
Fez	Tangier

MOROCCO, a city of North Africa, ninety miles from the Atlantic coast and 250 miles southwest of Fez, formerly a prosperous seat of Mohammedan learning. It is one of the capitals of the country of Morocco, and is favorably situated on an elevated plain about 1,500 feet above sea level, but there is little evidence of its former glory. A crumbling wall about seven and one-half miles in length encloses a city of narrow, crooked, dirty streets and shabby, one-story buildings, and though there are numerous gardens, open spaces and market places, the general aspect is one of dilapidation and extreme neglect. The Kutubia Mosque, one of nineteen Mohammedan churches, is almost the only stone building in the city. Another prominent structure is the Imperial Palace of the sultan, the buildings of which cover an area of 180 acres, encircled by a wall.

The manufacture of Morocco leather, formerly of much greater importance than now, is the only industry of note. Of the population, variously estimated at 50,000 to 75,000, a large number are Jews. There are not more than 500 European residents. Morocco was founded in the eleventh century, reaching the height of its prosperity about 1400. It then had a population of about 700,000. Civil wars and rebellions caused its decline, and its people are still turbulent and unruly.

MOROCCO, a choice variety of dressed leather, made from the skins of goats, and produced originally by the Moors in Southern Spain and Morocco, whence its name. From those districts the industry spread to the Levant, Turkey and the countries in North Africa bordering on the Mediterranean Sea. The characteristic qualities of genuine morocco are its elasticity, softness, fineness of grain and texture. Imitation morocco is now prepared successfully from the skins of calves and sheep, and is used in binding books, upholstering furniture and making fine shoes. See LEATHER.

MORPHEUS, *mawr'fe us,* in classic mythology, the name bestowed upon a minister of Somnus, more familiarly called the god of sleep. He is represented as an aged man with wings, pouring a vaporous narcotic from a horn.

MORPHINE, *mawr'fin,* or *mawr'feen,* a powerful and dangerous drug, in commercial form appearing in white, crystalline grains. Taken in small doses it will relieve pain; physicians occasionally prescribe very small quantities to induce sleep. Large doses are apt to produce unconsciousness or convulsions and sometimes result fatally. It must not be taken except upon expert medical advice, as a habit is easily formed which is exceedingly dangerous and difficult to overcome. Frequent use of the narcotic may cause loss of flesh and color, a weakened memory and a lowered moral standard. Recovery from the deadly effects of the drug is slow and tedious, but it is possible in time

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for skilled physicians to restore victims of the habit to normal conditions. For medicinal purposes, morphine is usually administered in fluid form by hypodermic injection and is readily absorbed by the system. It is also a powerful emetic, and is an important principle in opium. It will crystallize in brilliant, colorless, odorless prisms. See NARCOTIC.

MORPHOLOGY, *mor fol' o ji,* the branches of biological and botanical science which deal with the form and structure of animals and plants. It investigates the development of animal and plant forms, rather than their uses, studies the life history of the organism as a whole and also of its separate organs, and traces the resemblances and differences between different forms. In the study of botany morphology is sometimes spoken of as *structural botany* (see BOTANY). The study of animal structure is the foundation of the science of physiology. It is by means of morphology that the material is obtained for all true systems of classification and arrangement.

The term was first employed by Goethe, and is from the Greek, *morphe,* meaning *form,* and *logos,* which means *doctrine.* He was the first to draw attention to the relations in form presented by living beings. Haeckel's work on the science of morphology is the most famous book on the subject.

MORRIS, CLARA (1849-), a celebrated actress who for many years stood, among women, practically at the head of her profession. She was born in Toronto, Canada, but at an early age commenced her stage career in the United States, as a member of a ballet. Her success in such plays as *L'Article 47, Camille* and *The New Magdalen* won for her an enviable reputation. In 1874 she married, and in private life is known as MRS. F. C. HARRIOT. After 1885 her long tours were infrequent, and much of her time was given to writing. Stories of children and of the stage are among her important literary efforts. A revival of *The Two Orphans,* with an all-star cast, brought her again before the public in 1904. She lives on the Hudson River, a few miles north of New York City.

MORRIS, GOUVERNEUR (1752-1816), an American patriot and statesman, who assisted in drafting the United States Constitution. He was born at Morrisania, N. Y., and was graduated from King's College, now Columbia University, in 1768. After graduation he studied law and in 1771 was admitted to practice. Four years later he was elected from Westchester County to the provincial congress of New York, and in 1776 helped to draft the constitution of New York State. From 1777 to 1780 he served in the Continental Congress, and in 1781 was appointed assistant superintendent of finance under Robert Morris, who rendered invaluable assistance in financing the Revolutionary War.

GOUVERNEUR MORRIS

As a delegate to the Constitutional Convention of 1787 he was actively on the side of Alexander Hamilton, and to him is due the chief credit for the literary form of the Constitution. Morris was appointed minister to France in 1792 by President Washington, and from 1800 to 1803 held a seat in the United States Senate. In 1810 he became chairman of the Erie Canal Commission. He published pamphlets on taxation and currency and also wrote political satires for newspapers. His life, written by Theodore Roosevelt, was published in the "American Statesmen Series" in 1888. A great-grandson, who bears his name, is a widely-known magazine writer of short, popular stories. (See below.)

Gouverneur Morris (1876-), a writer of clever short stories and novels, whose characterizations are taken principally from the wealthy leisure class. His literary style is delicate and bright, and his works are frequently illustrated by Howard Chandler Christy or J. C. Leyendecker. His home is in New York City; he comes of an old influential New York family, and is the great-grandson of Gouverneur Morris, one of the leading Revolutionary statesmen. He was graduated from Yale in 1898 and since then has devoted his time to literary production.

MORRIS, ROBERT (1734-1806), was born in Liverpool, England, but when a young man he emigrated to the English colonies in America and became famous as a financier of the Revolutionary period. He gave large sums of money to the government and risked great personal loss in the cause of his country. Through his financial assistance the campaign of 1781 became possible, resulting in the capture of Yorktown. He was a delegate to the Continental Congress in 1775 and signed the Declaration of

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Independence in 1776. He established the Bank of North America in 1781 and later became a member of the first United States Senate. In marked contrast to his earlier success in finances, some of his later years were spent in a debtor's cell, owing to heavy speculations, but he was released by the bankruptcy law of 1802.

MORRIS, WILLIAM (1834-1896), an English poet and artist, and designer of the well-known Morris chair, was born at Walthamstow, in Essex. He was a most precocious child, reading the Waverly Novels at the age of four; yet he was fond of out-of-door life, and used to ride on horseback about Epping Forest in a toy suit of armor, acting out stories of his favorite heroes. At Marlborough School he failed to distinguish himself, but at Oxford he proved a real influence in his little circle. One of his closest friendships, formed in college, was with Edward Burne-Jones. Morris contributed to the *Oxford and Cambridge Magazine,* which was issued for a year at his expense; and in 1858 produced *The Defence of Guenevere, and Other Poems,* which possess the very spirit of medieval romanticism.

Although he had intended entering the Church, he decided upon architecture as a profession; with Burne-Jones and Rossetti he exercised his talents at painting, and finally found his real interest in the subject of house decoration. In 1861 he helped to found a company for the manufacture of artistic furniture and decorative articles, and thereafter devoted much of his time to this enterprise and to the art of bookbinding. In the meantime he continued his poetic production, chiefly of stirring narratives on subjects from ancient and medieval history. Notable among these are the *Life and Death of Jason; The Earthly Paradise; Sigurd the Volsung and the Fall of the Niblungs; The House of the Wolfings* and *The Story of the Glittering Plain,* these last two in prose and verse combined.

From 1885 until his death he was a strong advocate of Socialism, on the principles of which he wrote and lectured; and he was the personal friend of the workingmen of his neighborhood. It is for his far-reaching influence in improving the general taste in household furnishing that Morris is especially famous. His statement "I would have nothing in my home that I do not know to be useful or believe to be ornamental" states his doctrine.

Consult Noyes' *William Morris;* Cary's *William Morris, Poet, Craftsman and Socialist.*

MORRIS PLAN BANKS. A new type of bank has recently appeared in the United States, and is rapidly achieving importance. Its purpose is to lend money to "the small man," who, no matter how good his character, has previously been unable to borrow in times of need except from "loan-sharks," charitable organizations or friends. In Germany there are over 17,000 banks of similar purpose, in Italy nearly 1,000, and the greatest banks in France will lend sums even smaller than ten dollars. But, until Mr. Arthur J. Morris of Norfolk, Va., founded the first bank in 1900, there was probably no such institution in America. At first the Morris Plan spread slowly; at the end of October, 1914, there were only fifteen banks. But at the close of 1916 there were sixty banks in operation or being organized, and in August, 1916, loans passed the mark of $20,000,000 a year.

The average borrower of this type of bank has an income of $25 a week. Sometimes he wishes to repay other debts, and if he has been a victim of a "loan-shark" the bank will prosecute the usurer for him. At other times the borrower needs money for emergency expenses, or wishes to expand a small business. Usually he borrows about $100; this he pays back at the rate of $2 a week, with bank interest. His note is indorsed by two men of his own station in life, who are notified as soon as he fails to make a weekly payment. Less than one dollar is lost in every thousand loaned under the Morris Plan, and only about twenty dollars in every thousand are paid by indorsers. Among the officers of the first New York bank are a former state bank controller, a former assistant secretary of the navy, two railroad presidents, the president of a large trust company and the heads of some of the best-known manufacturing companies in the country.

MORRISTOWN, N. J., the county seat of Morris County, is a wealthy residential town thirty miles west and north of New York City It is a favorite resort because of its beautiful location in the hills and its healthful altitude. It is on the Whippany River and on the Delaware, Lackawanna & Western, the New Jersey & Pennsylvania and the Morristown & Erie railroads and an interurban electric line. The area is three square miles. In 1910 the population was 12,507; in 1916 it was 13,284 (Federal estimate).

Practically the only industry is the cultivation of fruits and flowers (especially peaches and roses) and vegetables, which are shipped

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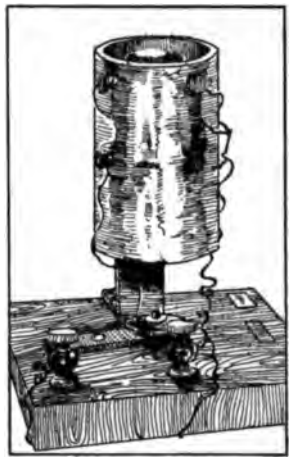
to the large markets. Among a number of fine public structures are the public library and lyceum building, the Federal building, erected in 1915 at a cost of $125,000, a Y. M. C. A. building, Vail Museum, constructed in 1916, at a cost of $150,000, Memorial and All Souls' hospitals and Randolph Military Academy. The site of old Fort Nonsense, constructed by Washington on a hill near the center of the town, is marked by a memorial monument. A soldiers' monument stands in the public square.

Morristown was settled in 1760 by Puritans, and in 1740 received its name in honor of Lewis Morris, then governor of New Jersey. During the War of Independence it was twice the headquarters of the American army under the command of Washington. The house which he occupied is still standing, and in it is a collection of relics owned by the State Historical Society. A part of the *Savannah,* the first steamboat to cross the Atlantic, was made at the old Speedwell ironworks, which in 1909 were nearly destroyed by fire.

MORSE, Samuel Finley Breese (1791-1872), an American who acquired fame through various notable achievements, but who will always be best known as the inventor of the electric telegraph. He laid the first submarine telegraph line in New York harbor, and he took the first daguerreotype made in the United States. His distinction as an artist was, perhaps, only a little less than that as an inventor. He was one of the best of the earlier American portrait painters, was one of the founders and the first president of the National Academy of Design, and for a time professor of the history of art at the University of the City of New York.

SAMUEL F. B. MORSE
His invention of the electric telegraph places his name high in the list of the world's benefactors.

It was during the time he was giving his attention to art that he conceived the idea of the telegraph. When his instruments were perfected he applied to his own government for financial aid to put them to a test, but his invention was ridiculed. Then he tried to interest foreign governments, but without success. He again applied to the United States for assistance and finally, in 1843, Congress appropriated $30,000 for the construction of a telegraph line from Washington to Baltimore. After many hardships, the line was completed on May 24, 1844, and the now historic words, "What hath God wrought?" were sent over the line as the first public message. Credit should be given Professor Leonard Gale and Alfred Vail, who were associated with Morse in his work, and to others who furnished material assistance in bringing the telegraph to success, but Morse was the inventor in the true sense of the word. No other American inventor has received greater honors than those later conferred on him by his own country and by foreign nations.



THE FIRST MORSE TELEGRAPH

MORTALITY, *mor tal' i ti,* Law of, a principle which determines what average proportion of the persons who enter upon a given period of life will die before they complete that period. The law has been obtained from a study of the records of mortality and an analysis of the experience of insurance companies. The resulting statistics have been formulated as *tables of mortality.* A table for the United States is given below, the number of individuals of each class considered being one hundred:

AGE	DEATH RATE	
	MALES	FEMALES
0 to 4	56.7	47.5
5 to 14	4.4	4.2
15 to 24	6.7	6.1
25 to 34	9.5	8.5
35 to 44	12.4	10.5
45 to 64	24.1	20.1

The following table shows the death rate for each of the Canadian provinces except New Brunswick, returns from that province not being available. In Canada the registration of births, marriages and deaths is under provincial control, and the rate for the Dominion as a whole has not been estimated:

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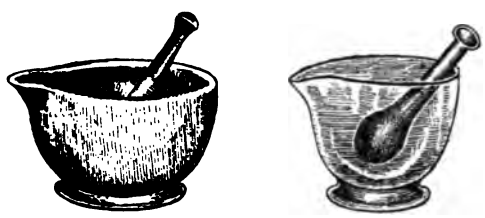
PROVINCES		DEATH RATE PER 1,000
Prince Edward Island	1911	11.89
	1913	10.49
Nova Scotia	1911	16.73
	1912	14.34
	1913	14.52
Quebec	1911	17.92
	1912	16.15
	1913	17.33
Ontario	1911	12.63
	1912	12.56
	1913	12.70
Manitoba	1911	12.03
	1912	12.58
	1913	13.10
Saskatchewan	1911	5.54
	1912	6.29
	1913	6.58
Alberta	1911	9.69
	1912	9.71
	1913	9.09
British Columbia	1911	9.32
	1912	10.15
	1913	9.33

The average death rate is affected by such constant causes as race, climate, age, etc., and by such irregular causes as war, famine and pestilence. The tendency of mortality to diminish with the progress of civilization is now established by statistics. The average age of Americans at death in 1890 was 31.1 years; in 1900 it was 35.2, and in 1912, 40.6. The average annual death-rate per thousand in 1900 was 17.8, in 1912, 13.9. In 1912 the only important countries of the world having lower death rates than the United States were the following: Norway (13.4 per 1,000), England and Wales (13.3), Denmark (13), Holland (12.3), Australia (11.2) and New Zealand (8.9). Canada's rate is above. See LIFE, LENGTH OF.

MOR'TAR, a vessel made of hard wood, stone, marble, pottery, glass or metal, in which substances are pounded into powder by the use



STONE AND GLASS MORTARS
With pestles.

of a pestle. Porcelain and glass mortars are used principally by druggists and chemists. In the early days the mortar of wood was a household commodity, being used when grain and seeds were pounded into meal and powder. The first mills, employed for the grinding of corn, were mortars made of stone and hard wood.

MORTGAGE, *mawr'gayj.* A farmer wants to increase the output of his farm by adding modern planting, cultivating and threshing machinery, but is short of ready money. A family owning a home has an opportunity to secure the adjoining lot at a bargain, yet cannot immediately produce the full purchase price. A husband and wife living in a rented flat decide to buy a home of their own, but have only a few hundred dollars in the bank to invest.

One way in which these people can carry out their plans is to arrange with some bank, real estate firm or private investor for a loan—amounting to only part of the property's value—giving a *mortgage* on the entire property as security for the repayment of the money. The mortgage is virtually a sale or transfer of the property to the lender, or *mortgagee;* but it differs from an actual sale in that the borrower, or *mortgagor,* remains in possession; and such tentative sale is canceled if, by the time specified, the debt is repaid with the interest agreed upon. This explains the derivation of the word *mortgage,* which is the French equivalent for *dead pledge.*

The Mortgage Deed. In a formal document, also called the *mortgage,* are set forth an accurate description of the property for purposes of identification, and a clear statement of the conditions of payment. There may also be clauses ruling the entire debt payable if mortgagor fails at any time to pay interest, taxes and assessments, as agreed, or giving the mortgagee power to sell without the formality of foreclosure proceedings, should the mortgagor be unable to repay the loan. This record, which must be filed at the county recorder's office, protects innocent third parties who might otherwise purchase the property for its full value without knowing there was a mortgage upon it.

Default and Foreclosure. In case the mortgagor is unable to meet the mortgage when it falls due, and fails to renew it, he is said to *default.* In former times this meant that the mortgagee acquired the property without further action, even though its value might far exceed the money due him. This was according to the common-law theory of mortgages, which considered the title to the property invested in the mortgagee. The modern interpretation is that the mortgagor is the true possessor and has a right to redeem until deprived of that privilege by formal foreclosure.

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On the expiration of a certain period after the date of maturity—the length of time varying in different states and provinces—the mortgagee may file a *foreclosure suit,* praying the court to debar the mortgagor from his *right of redemption* in order that the mortgagee may have the return of his money. In some jurisdictions the mortgagee may foreclose simply by advertising the fact in the newspapers for a specified number of weeks; and in districts where there is no newspaper, this announcement may be made by nailing to the courthouse door a notice to the effect that the property will be sold on a certain date at public auction. With few exceptions, only *foreclosure by sale is recognized.* This means that the property is sold, and any surplus remaining after the claims of the mortgagee are settled is turned over to the mortgagor.

Mortgages as Investments. Real estate, since it is not removable, is the most reliable security possible, and for this reason people looking for safe investments buy mortgages from banks and real estate firms which made the loans originally. First mortgages are, of course, the most favored, since they take precedence over second and third mortgages when it comes to repayment through foreclosure proceedings. Where the property has depreciated in value the holder of a first mortgage is generally protected to the extent of his investment; the owner of a second or a third mortgage may lose part or all of what he has invested, for always the first mortgage is paid first. The rural credits system has greatly increased the number of farm mortgages within recent years (see RURAL CREDITS).

Chattel Mortgages. A mortgage given on movable goods—called *personal property* or *chattels*—is known as a *chattel mortgage.* This may be given on any legal property, even on a planted crop not yet ripe or on a stock of goods which the mortgagor continues to sell and replenish. Where the holder of the mortgage has reason to feel that his security is unsafe, he has the privilege of taking possession of the property in a manner prescribed by law, subject to the mortgagor's right to redeem by paying debt and interest. L.M.B.

Consult Jones's *Treatise on the Law of Mortgages of Real Property;* Pingrey's *Treatise on the Law of Chattel Mortgages.*

MORTON, JULIUS STERLING (1832-1902), an American political leader and an ardent nature lover, who deserves credit for having established Arbor Day, a tree-planting day which now has a wide observance (see ARBOR DAY). He was also a pioneer newspaper man, having founded the Nebraska City *News,* the first newspaper established in Nebraska. At the time of his death he was editor of the *Conservative.* Adams, Jefferson County, N. Y., was his birthplace, but when he was two years old, his parents removed to Michigan. Julius received his early education in the Methodist Episcopal Academy at Albion, now Albion College. In 1850, at the age of eighteen, he entered the University of Michigan, completing his course at Union College in 1854. One year later he went to Nebraska to live. In 1874 at his suggestion Nebraska appointed a day for tree planting throughout the state, a custom which has gained strength with the years.

In 1856-1857 he served in the territorial legislature, the next year was appointed secretary of the territory, and for some time was acting governor. In 1866, and again in 1881, he ran as the Democratic candidate for governor, both times without success. From 1893 to 1897, under President Cleveland, he held the office of Secretary of Agriculture, a post he filled with highest efficiency. He spiritedly opposed William J. Bryan in Nebraska politics, and was allied with the gold-standard faction of the Democratic party. In 1901 President McKinley appointed him a United States Commissioner for the Louisiana Purchase Exposition. See full-page illustration, in article NEBRASKA.

MORTON, LEVI PARSONS (1824-), an American banker and statesman and former Vice-President of the United States. He was born at Shoreham, Vt., and was graduated from Shoreham Academy. In 1850 he removed to Boston and became a member of the firm of Beebe, Morgan & Co., merchants. He settled in New York in 1863 and founded the banking house of L. P. Morton & Co., which later became Morton, Bliss & Co., subsequently establishing branches and affiliated firms in London. In 1878 he was elected to Congress by the Republicans, and was reëlected in 1880. President Garfield appointed him minister to France, and he filled the post acceptably from 1881 to 1885. In 1887 he purchased "Ellerslie," his magnificent country estate at Rhinecliff on the Hudson River. He was elected Vice-President of the United States on the Republican ticket with Benjamin Harrison in 1888, and in 1895-1896 served one term as governor of New York state. After his retirement from official life he continued his business of banking and also became identified with large insurance interests.

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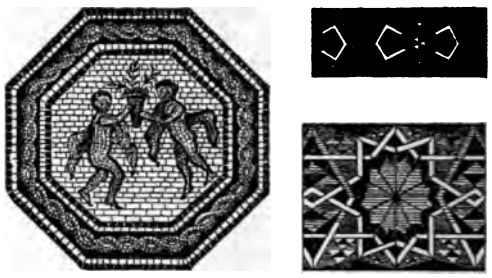
MORTON, Oliver Perry (1823-1877), an American political leader, who, as governor of Indiana, rendered valuable service by his active support of the Federal government, during the trying period of the War of Secession. Born in Wayne County, Indiana, he studied law and was admitted to the bar in 1847. Owing to his opposition to the Kansas-Nebraska Bill (which see), he left the Democratic party and became the first Republican candidate for governor of Indiana. He was defeated, but was elected lieutenant-governor in 1860, succeeding to the governorship the following year. He was reëlected in 1864. Three years later he entered the United States Senate. In 1876 he was a candidate for the Republican nomination for President, and the following year served on the electoral commission which decided the contest between Hayes and Tilden for the Presidency. See Electoral Commission.

MORTON, William James (1845-), an American physician who made a notable contribution to the progress of medicine and surgery by devising an electric current for producing the X-ray (see Roentgen Rays). He is the son of William T. G. Morton, the physician who brought ether into general use as an anesthetic. Dr. Morton was graduated at Harvard University in 1867, and in 1872 received his professional degree from Harvard Medical School. Thereafter he practiced in Maine, at Boston and at Kimberley, South Africa. Returning finally to America, he became editor of the New York *Journal of Nervous and Mental Diseases,* and in 1890 was appointed professor of nervous diseases at the New York Postgraduate Medical School. In January, 1913, he and Julian Hawthorne were found guilty of violating United States postal laws in connection with their exploitation of certain mines in Canada. Dr. Morton, after a few months' imprisonment, was pardoned by President Wilson and restored to full rights of citizenship.

MORTON, William Thomas Green (1819-1868), an American dentist, born in Charleton, Mass., the first man to bring ether into general use as an anesthetic. The first notable operation in which he made use of ether was performed by him in 1846, in the Massachusetts General Hospital. To him also is due the invention of many improved and painless methods in dentistry. After difficult, painstaking experiments he made known his successful results, only to have Doctor C. T. Jackson, a rival dentist, also claim the honor of the discoveries. Therefore the Montyon prize of the French Academy was awarded equally to the two. Dr. Morton, however, refused to accept his share. The American government utilized his invention, and he claimed a right to adequate payment. This was denied him, and he spent much of his later life in unsuccessful lawsuits and contests. See Ether; Anesthetic.

MOSAIC, *mo za' ik,* in its commonest application, is a floor or wall decoration made by fitting together in cement small pieces of hard substances, such as stone or glass. The material used distinguishes mosaics from *inlays* of



EXAMPLES OF MOSAICS

wood, ivory and the like. For floors of rooms, stone or cement shapes are commonly employed, usually in two or more colors. While this art is practical for the above purposes, it may also be used for decorative designs, colored glass and artificial stones being used. The workmanship in this branch of the art may be so accurate as to imitate paintings, tapestries, etc. Excellent reproductions of the paintings of artists have been executed in mosaic. Some of the finest effects in this art are to be seen in Saint Paul's and Saint Peter's in Rome, in Saint Mark's in Venice and in the Capitoline Museum in Rome. A branch of the art, known as *Florentine mosaic,* employs stones and shells in their natural color to make such articles as jewelry and personal ornaments.

MOSBY, *mohz' bi,* John Singleton (1833-), an American public man, who, though educated for the profession of law, won renown in the War of Secession as leader of an independent band of cavalry. He was born in Powhatan County, Va., graduated from the University of Virginia in 1852 and admitted to the bar three years later. At the outbreak of the war he left his practice in Bristol, Va., and joined the Confederate army. He served in the campaign of General Joseph E. Johnston in the Shenandoah Valley, and in 1862 became commander of "Mosby's partisan rangers," a company of horsemen who caused great damage by destroying supply trains and cutting communi-

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cations of the Union armies. Several expeditions were sent out to capture him, and he was wounded several times, but he always evaded the enemy.

After the close of the war he established a law office at Warrenton, Va., and joined the Republican party. In 1876 he supported Rutherford B. Hayes for President of the United States, and in a public letter first used the phrase, the "Solid South," which remained for years a popular expression referring to the fact that all the Southern states were Democratic. From 1878 to 1885 Mosby was United States consul at Hong-kong, and after his return to America opened a law office in San Francisco. In 1904 he became assistant attorney in the Department of Justice in Washington, holding this position until 1910. His published works include *The Dawn of the Real South* and *War Reminiscences.*

MOSCOW, *mos'ko,* the second capital of Russia and the former residence of the czars, is the chief city of the province, or government, of the same name. Situated on the banks of the Moskva, 400 miles southeast of Petrograd, it is a little to the north of the most populous parts of Russia. Rich in traditions and filled with ancient monuments, it is a veritable storehouse of Russian archaeology. In its old churches it shelters holy relics and sacred pictures venerated by the entire people. To the pious Russian imagination, indeed, the sacred edifices grouped within the Kremlin are the very holy of holies.

The Kremlin is an ancient fort occupying a hill near the center of the city. It is described in an article under that title. Of the many sacred buildings within the Kremlin the most venerated is the ancient Uspenskiy Cathedral, which was built towards the end of the fifteenth century on the site of a still more ancient edifice. It contains the oldest holy picture in all "holy" Russia. The cathedral of the Archangel Michael shelters the tombs of all the czars down to the time of Peter the Great, and near by is a convent dating from the close of the fourteenth century which has served as the burial place of wives and sisters of the czars. Surrounded by the towers and turrets of this stately citadel is the "King of bells," the largest bell in the world (see BELL).

To the east of the Kremlin lies the portion of the city known as the Kitai Gorod (Chinatown), which still forms the commercial center of Moscow. About the Kremlin and the Kitai Gorod extends the so-called White City (Byely Gorod), the center of fashion, and beyond this again in a broad zone stretches the Earthen City (Zemlyanoi). The suburbs are more extensive than the city itself.

Not all the notable public buildings of Moscow are to be found in the Kremlin. The most striking building in the city is the Cathedral of Saint Basil, built in the sixteenth century; the Pokrovsky Cathedral is one of the architectural wonders of Russia. It is topped with towers all differing from one another and representing in their coloring pineapples, melons,

LOCATION MAP
Showing the network of Russian railroads which center in the city.

etc. Worthy of note also are the modern Church of the Saviour, the Palace, occupied in 1812 by Napoleon, and the town hall. Moscow is the seat of the Imperial University, founded by the Empress Catharine in 1755. It has a notable museum and a library of 300,000 volumes. Four thousand students are regularly enrolled.

Moscow is the chief industrial city of the Empire and one of the great commercial centers of Europe. Six railroads converge upon it from all parts of European Russia as well as Siberia. These, with its position, make it the natural center for the internal commerce of Russia. The principal manufactures are textile fabrics, woolen, cotton and silk; but hats, hardware, machinery, leather, chemical products and spirits are also produced in large quantities.

The foundation of the city dates from the twelfth century, although the site was probably occupied long before. As the residence of the

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metropolitan, or official of the Church next in authority to the czar, it was the center of the Russian religious world, and by the fourteenth century was also the capital of Muscovy. It remained the capital of the Russian Empire until Saint Petersburg (now Petrograd) was founded in 1703. The chief event in its turbulent history was the invasion by Napoleon in 1812 and the subsequent burning of the city to defeat him. In 1896, during a festival in honor of the coronation of Nicholas II, the crowd was so immense and the excitement so great that over 2,000 persons were crushed to death. Population of the city in 1910, exclusive of the suburbs, 1,481,230. G.B.D.

Consult Zabyelin's *History of Moscow;* Grove's *Moscow.*

MOSELLE, *mo zel',* a river which rises in the Vosges Mountains, in the extreme northeastern part of France, and follows a winding course north and east, emptying into the River Rhine at Coblenz. It is about 315 miles long, and is navigable for small vessels for nearly 200 miles. The wines of the Moselle basin are famed the world over for their delicate flavor. During the first month of the War of the Nations the Germans followed the Moselle for nearly its whole length in their drive on Paris (see WAR OF THE NATIONS).

MO'SES, according to the Biblical account, was the great leader who by uniting the Hebrew tribes into a confederacy ushered in their national life. The story of Moses is told chiefly in the book of *Exodus.* As in the case of all great heroes of ancient times, legend has gathered around the personality so that it is not easy always to separate fact from fancy. People are fond of their heroes, and therefore, as they move further away from them in time, stories arise showing the strong attachment to them and the impression made by their careers. We cannot tell exactly when Moses lived because our means of calculating dates for the early periods of mankind's history are still imperfect. We may say roughly that he carried out his greatest work in leading the Hebrews out of Egypt about 1250 B.C.

The Hebrews belong to a large group known as the Semites, and at various times in Egyptian history Semitic tribes, whose home was in Palestine or in Arabia, migrated to Egypt, attracted by the high civilization that flourished there and the good opportunities for pasturing flocks. These foreigners were at times well treated by the Egyptian rulers, but often were pressed into service to build the great pyramids and the storehouses and other buildings in Egypt. The Biblical story relates that at the time Moses was born the Hebrews living in Egypt were very sorely oppressed, both by being obliged to do hard service and by living under very serious restrictions.

Childhood and Youth. The Bible story tells us that the Pharaoh at the time that Moses was born, fearing lest the Hebrews might increase too rapidly, ordained that all male infants should be cast into the Nile. The mother of Moses, when the little child was born, hid the babe for some months, and then, afraid of being discovered, made a little box of bullrushes and placed the babe inside of it among the reeds in the river. She asked her daughter to watch the box and see what would become of the boy. The daughter of Pharaoh on coming down one day to bathe with her maidens in the river, saw the little box and opened it. Filled with pity for the Hebrew child, she decided to save his life by raising him as her own son. The sister of Moses, who had been watching the scene, then came to the princess and said, "Shall I go and call to thee a nurse of the Hebrew women, that she may nurse the child for thee?" The princess agreed to this; Miriam brought her own and the babe's mother, to whom the child was thus returned home to be weaned and after that to be brought up at the court of Pharaoh.

This is the kind of stories that were told about Moses, and no doubt there were many others besides those found in the book of *Exodus* which have not been preserved. They are intended to illustrate the special providence that watched over the babe destined to be the leader of his people. Another story told to illustrate the sympathy and love of Moses for his brethren related how one day his anger was aroused by seeing an Egyptian beat a Hebrew. He turned on the Egyptian and slew him. The next day he saw two Hebrews fighting with one another and tried to separate them, when one of the two reproached him, "Dost thou wish to kill me, as thou didst the Egyptian?" Moses knew from this that his deed had become known and fled for his life. He wandered to the distant land of Midian and there took care of the flocks of a priest in that country, who was known as Jethro. He married Jethro's daughter.

Moses, the Leader. In order to explain how Moses came to undertake the task of bringing his oppressed brethren out of Egypt, a very

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impressive story is told. One day while feeding the flocks of Jethro he saw a bush apparently burning without being consumed. As he approached to look more closely at the strange spectacle, a voice cried out from the bush and told him to go back to Egypt and lead his people out of the land of bondage into the promised land of Canaan. He must have accomplished a task of this kind, for otherwise, the stories would have no meaning at all. It is natural that so great an event should have made a lasting impression on the people who

STATUE BY MICHELANGELO
This famous *Moses* stands in the Church of San Pietro, Rome.

loved to dwell on the miraculous way in which, with the help of God, Moses saved the people from their oppression at the hands of the Egyptians. The stories are most dramatically told —how Moses, accompanied, according to a later tradition, by Aaron, appeared frequently before Pharaoh, imploring him to let his people go, and, when Pharaoh refused, bringing all kinds of plagues upon the country.

The last and most terrible plague, sent as a punishment because Pharaoh each time that some misfortune came promised to let the people go and then withheld his promise, was the killing of all first-born children in Egypt through the Angel of Death. This angel passed through the land, says the impressive story, and spared the houses in which Hebrews lived. Through the Angel of Death every household in Egypt was thrown into mourning, and Pharaoh finally felt obliged to yield. As though to make the story of the deliverance still more dramatic, Pharaoh is represented as having again regretted his decision, after the Hebrews had left, and pursued them to the Red Sea. Here a strange thing happened. Moses called to his people, when they saw the Egyptians in pursuit, "Fear not; the Lord shall fight for you." The Bible then relates that a strong east wind divided the waters and all the people marched over in safety; but when the Egyptians followed the waters rolled back and all of Pharaoh's horsemen were drowned in the sea. Thus the Hebrews were brought out of Egypt, and there is no doubt that it was Moses who accomplished this.

The Period in the Wilderness. We now have a series of stories in the book of *Exodus,* describing how the Hebrews moved from one spot to another, settling for a time in one place and then passing on. These accounts show that at the time the Hebrews were still in what is called the nomadic stage, somewhat like the modern Arabic Bedouins, who likewise move from place to place (see NOMAD LIFE). The Hebrews, however, had reached the stage when, in their wanderings, they were accompanied by their flocks, and it was the necessity of securing pasturage that led them frequently to change their place of sojourn.

Later on, after the death of Moses, we find the Hebrews entering the land of Canaan and, dispossessing the inhabitants, becoming tillers of the soil, or agriculturists. People who reach this stage of culture no longer move from place to place. They become bound to the soil, which they cultivate, and of which they become the owners. When people own land they must stay there to watch it and take care of it. The period between the exodus from Egypt and the conquest of Canaan is generally spoken of as the time of the wanderings in the wilderness, near and around a sacred mountain which was known as Mount Sinai. This period of the wanderings is put down as forty years in the Bible, which, however, is merely a round number to indicate an entire generation. Probably several generations elapsed, however, before Canaan became the land of the Hebrews. Im-

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pressive accounts again appear in the book of *Exodus* about this period of the wanderings—how the people frequently grew impatient and, forgetting the hardships of Egypt, reproached Moses for having led them into a land where it would be so difficult for them to find subsistence.

Another Biblical story tells how the people on reaching Mount Sinai received a revelation of God himself amidst thunder and lightning, and how God made agreement between himself and his people whereby they were to worship only the God through whose help they were brought out of Egypt, and in return God would look upon the Hebrews as his own people. Moses was called by God to come to the top of the mountain, there to receive tablets of stone containing the laws which were to govern the people. While he was absent on this mission, the people, fearing that he would not come back, asked Aaron to make for them a golden calf, which they worshiped and around which they danced, looking upon the calf as though it were an image of God. This was against the teachings which Moses gave to his people, for their God did not want them to worship any image of anything in heaven, in earth, or in the waters under the earth. Very dramatically the scene is described—how Moses came down from the mountain and saw the people around the golden calf, became angry and dashed the tablets to pieces. It is interesting to see that sometimes accounts show that even Moses, the great leader, was not perfect. Because, on one occasion, he did not carry out an order of God in the way in which it was intended, he was told that he himself would never enter the promised land of Canaan. In accord with this promise, we learn that Moses as an old man ascended another mount, which was known as Nebo, from the top of which he could see the land of Canaan; there, gazing upon the land in which his people were to dwell and to pass through such strange and varying fortunes, at the age of 120 years, he died. The Bible adds that no one knows where he is buried.

The Great Work of Moses. If we would sum up what we actually know about Moses, it may be said that through his career he created the Hebrew nation. That is to say, from him dates the beginning of the history of the Hebrews as a nation instead of a motley collection of clans or tribes with no bond uniting them except that of blood. Though centuries elapsed before the union between these tribes was so strong as to mold them into a single group, yet the work was begun by Moses, and what followed after his death was merely the further unfolding of the ideas which he gave to his people. It was through Moses that the people, abandoning the worship of other gods, looked upon Jehovah, or, as His name is probably to be read, *Yahweh,* as the only God.

Moses also began the organization of the people, and for this purpose gave them a body of laws which, enlarged as new conditions arose, with all kinds of interpretations of the laws and comments and illustrations to apply to certain cases, gradually grew into a very large series of laws traditionally known as the Laws of Moses. These laws, divided into a certain number of groups which to-day we call codes, and dating from various periods, are scattered throughout the books of *Exodus, Leviticus* and *Numbers,* while in the book of *Deuteronomy* we have still another code, gathering together about the middle of the seventh century B.C. all the laws of older and later days. So great was the influence exerted by Moses and so deep the impression made by him that for the Hebrews he became *the* lawgiver to whom, therefore, tradition ascribed all the laws by which the Hebrews were governed.

Moses thus stands before us as the great deliverer of his people, the organizer of the national life of the Hebrews, the religious teacher, and finally, the one with whom begins also the endeavor to regulate the relationships of individuals to one another by means of laws. The religious life of the Hebrews in the days of Moses, and long thereafter, was very simple. A sacred object which could be carried about was looked upon as a symbol of Jehovah, or Yahweh, and this sacred object was guarded by special attendants who afterwards, when the Hebrews in the land of Canaan began to build their little shrines and temples in the various places where they settled, became the priests. The organization of the priesthood is thus also traced back to the days of Moses, though we must remember that the priesthood did not become a large and important body until the days of Solomon, about 950 B.C., when the great Temple built at Jerusalem became the religious and political center of the country. M.J.

MOSQUE, *mosk,* a word which means to the Mohammedan what *church* means to the Christian—a place for prayer and worship. The first mosques were built with an open, rectangular court surrounded by colonnades. In the center of the court was a fountain for washing,

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a part of the religious service. All Mohammedans turn toward Mecca when they pray, and so that they might know the right direction one of the walls surrounding the court was built at right angles to the direction of the building from Mecca. In this wall is a niche, called the Mecca niche. Here the colonnades were deeper, and the place was known as the sanctuary, or prayer chamber. Beside the niche in the wall was the pulpit and platform from which the Koran was read. Each mosque had at least one minaret, a tall, slender tower from which the muezzin called the people to prayer (see MINARET, for illustration). Later, mosques were covered by roof and dome. The mosque of Damascus is one of the earliest ever built, and that at Cordova, Spain, is one of the most famous.

MOSQUITO, *mos ke'toh.* If one wanted in a single sentence a character sketch of the mosquito, few better could be found than Kipling's famous line, "The female of the species is more deadly than the male." The mosquito has earned the reputation of being the deadliest of insects, and it is the bloodthirsty mother mosquito that has earned this reputation for the species. In spite of her diminutive size and harmless appearance, she is as fierce, for her size, as a tiger, and by carrying disease has probably caused more deaths the world over than the sum total of tigers, panthers, lions and other wild beasts that have preyed on men since the beginning of time. Her only weapon is her "bill," more slender than the finest sewing needle; yet with this innocent-looking weapon the mother mosquito in one branch of the family often starts epidemics of malaria. In another branch she may use it to bring on scourges of yellow fever, or the hideous, incurable disease known as *elephantiasis.* In the least dangerous species it is the weapon that is responsible for the vexatious "bites" that detract from our enjoyment of summertime.

Science, however, has unmasked the mosquito's true character, and now it is showing the world how to wage successful war against it. In time the mosquito will doubtless become extinct; this depends entirely upon the activity with which man is willing to combat the pest.

A Mosquito's Biography. In England and some other countries the mosquito is known as a *gnat.* It is a cousin of the common house fly—indeed, its very name is a Spanish word meaning *little fly*—and, like the other members of its family, it begins life with the egg. However, since it is a water insect in its early stages, the mother mosquito looks about for standing water when she is ready to lay her hundreds of eggs. Her wings are not strong enough to bear her more than two or three hundred feet from her own breeding place, but unless human beings are very careful about such things, it is not difficult for her to locate near them a home for her family. She will use a stagnant pool or puddle, a gutter, a lily pond, the weedy banks of a stream, a rain barrel, a trough or cistern, a tree hollow filled with rain water, an open drain, a pail or tub, or an old shoe, dish or can which has been thrown out and left to collect rain. The important point is that she must find *still water,* so the eggs will lie safely on the surface scum until hatched. From forty to four hundred are deposited, sometimes singly; but in the most common species they are arranged on end in small masses like rafts. (See illustration, *a*).

The Baby Mosquito, or Larva. It makes an interesting study to pour some water from a rain barrel or pool containing mosquito eggs into a jar, covering the opening with fine screening or mosquito netting and watching the hatching process. In a day or more, depending upon the degree of warmth and light, there will appear long, squirming *larvae* called *wrigglers* (*b, c, d, e* in the illustration). If one of these wrigglers is put with a little water into a saucer and studied through a magnifying glass, it will

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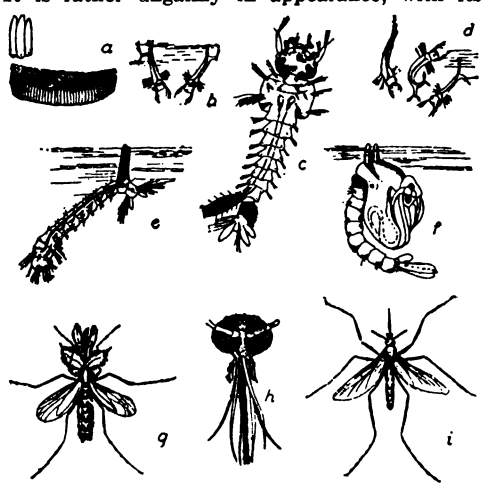
be noticed that a pair of fine brushes on its head act like brooms, sweeping toward the mouth the tiny food particles in the water. This scavenger service of the wrigglers is the only useful thing the mosquito ever does in the entire course of its existence, and even that service is of little benefit to man.

The microscope will show that the tail is forked, one of the two divisions serving as a breathing apparatus. Every few minutes the larva comes wriggling up to the surface for air, assuming the strange position shown in the drawing (*b, d*), head down and breathing tube extending just above the water. If for any reason it cannot get air it drowns—which is an important point to remember. Several times during its wriggler stage—usually lasting from one to four days—the insect sheds its skin, and when it does so for the final time it has changed to a new form.

The Half-Grown Mosquito, or Pupa. The young mosquito has now reached the *pupa* stage *(f)*. A familiar name for it is *tumbler,* or *jumper,* in reference to its gymnastic habits. It is rather ungainly in appearance, with its



LIFE HISTORY OF THE MOSQUITO

(*a*) Eggs in mass, with enlargements above; (*c*) (*e*) larvae (young), or wrigglers; (*b*) (*d*) wrigglers breathing at surface of water; (*f*) pupa, or tumbler; (*g*) male adult; (*i*) female adult; (*h*) bill of female.

over-large head and two breathing tubes, like small horns, which now project from the thorax. As it no longer has a mouth, it cannot feed, but spends the time at the surface; disturbed, it swims swiftly down into the water.

The Adult Mosquito, or Imago. In a short time, generally after two or three days more, the skin cracks along the back and the full-grown mosquito comes forth *(g, i),* using its cast-off skin for support while it dries itself in the sun. The transformation is now complete, and the insect begins its adult life, generally from one to two weeks in length. Wrigglers, tumblers or full-grown mosquitoes which are born late in the season, and caught in the first cold snap, will lie dormant until the spring thaw enables them to finish their natural term of life.

How It Feeds, Hears and Smells. The bill or proboscis *(h)* of the female is a wonderful instrument and very fitly called a *stylet.* Under the microscope it shows that it is composed of six fine, extremely sharp needles which pierce the victim's flesh, and a slender tube through which the blood is sucked into the insect's mouth. Thus what we call a mosquito "bite" is not really a bite, but a puncture made by this daggerlike mouth; and the irritation is caused by a bit of saliva injected into the wound, presumably for the purpose of thinning the blood and so making it easier for the insect to draw it into her mouth tube. The male mosquito is provided with a bill that can suck but not pierce. The *bushy antennae* (feelers) on either side of his beak serve him for ears, and when the female sings her shrill song these feathery hairs inform him by their vibration that she is in his neighborhood. It was this familiar hum that inspired Bryant's lines, *To a Mosquito:*

Fair insect! that, with threadlike legs spread out,
  And blood-extracting bill and filmy wing,
Dost murmur, as thou slowly sail'st about,
  In pitiless ear full many a plaintive thing,
And tell how little our large veins would bleed,
  Would we but yield them to thy bitter need.

The feelers at the base of the beak in both male and female mosquitoes are believed to be the organs of taste and smell.

The Ordinary Tormentor. The common mosquito, whose attentions we find so annoying, but which—in America, at least—is not accused of the crime of spreading disease, belongs to the group called *Culex,* the Latin word for *gnat.* The nicknames are *gutter mosquito* and *rain-barrel mosquito,* out of compliment to its peculiar taste in the matter of residence. This mosquito is a true "citizen of the world," equally at home in mountainous lands and in low-lying seacoast regions, in Arctic countries during their brief summer season, and in temperate and tropical climates. Those in Alaska, Greenland, Kamchatka, and around the Lake of the Woods in Canada are particularly numerous. The *Culex* are a very prolific clan, multiplying so rapidly that as many as a dozen

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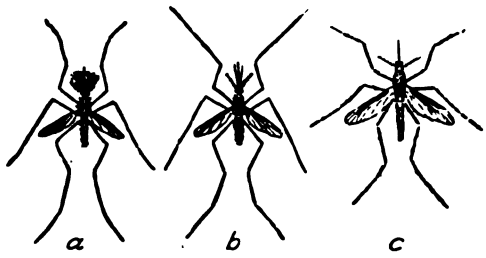
generations are possible during the course of a long, wet summer.

The Mosquito that Carries Malaria. It is only since about 1898 that all the evidence has been gathered that has laid the responsibility for spreading malarial and other fevers at the door of the tropical mosquito with spotted wings, called *Anopheles*. This name comes from a Greek word meaning *hurtful,* but an equivalent for "murderous" would not be an exaggeration. Its bill has but one needle, yet with that one it does a thousand times more harm than the *Culex* with six.

The Romans gave the name *malaria (bad air)* to the fever that carried off their people

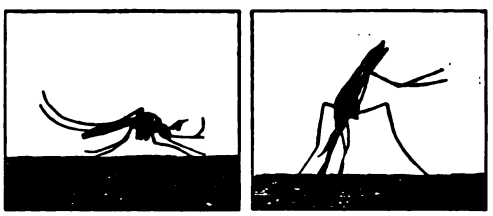


(*a*) Adult male *Anopheles* mosquito; (*b*) female *Anopheles;* (*c*) female, *Culex.*

by the thousands, because they believed it was caused by the poisonous vapors arising from the swamps and marshes that composed the great plain around Rome known as the Campagna. The night air was considered particularly dangerous; and doubtless in this ancient error may be found at least one source of the objection many people still have to sleeping with open windows. Physicians and naturalists, however, have proved that marshes are malarial simply because they offer a favorable breeding place for mosquitoes, and that the night air is dangerous only because the malarial mosquito chooses the nighttime to go food hunting.

Through countless experiments it was learned that when a mosquito has sucked into its mouth the blood of a person suffering from malaria, the saliva which it injects into the next person bitten will pass on the little parasite which is the germ of malaria. This much having been established, careful tests were then made to prove that the bite of the malarial mosquito is the only agency by which the malaria germ is transmitted. One such experiment was made in 1900, when two English physicians built a mosquito-proof house in the heart of the Roman Campagna and lived there through the rainy season. Since the mosquito seeks its food at night, they went indoors each evening at six o'clock, and although they took no other precaution neither contracted the disease. A further interesting experiment along these lines was carried out by sending a malaria-infected mosquito all the way from Rome to London and allowing it to bite a perfectly healthy subject, who was duly taken ill with the fever. Other similar experiments have been made, many of them in Cuba, Panama and Hawaii. Each one has only proved more conclusively than before that if all the mosquitoes in the world could be killed off, from egg to adult, there would soon be no more malaria.

The way to distinguish the malarial mosquito from other members of the mosquito family is by the fact that its larvae (young) remain at the surface of the water, and by the spotted wings and resting position of the adult insect. With head, body and tail in a straight line, it makes an angle with the surface on which it is resting; whereas in the other varieties the insect rests in a humpbacked position, with its abdomen parallel to the surface of support. It does not lay its eggs so promiscuously as the



At left, the *Culex* mosquito; at right, *Anopheles* mosquito. The latter always assumes the position shown when preparing to bite.

common mosquito, but chooses permanent pools or marshes. From this habit has come its popular name of *swamp mosquito.*

The Yellow-Fever Mosquito. To the scientists of America belongs the credit for trying and convicting the mosquito of the criminal act of transmitting yellow fever. The variety that carries this often fatal disease is the attractive silver-banded *Stegomyia calopus,* also called *Stegomyia fasciata* (Greek, meaning *fly with striped legs).* In 1900, while the American army was occupying Cuba after the war with Spain, a commission was appointed under Dr. Sternberg, surgeon-general of the United States army, to work on the yellow-fever problem in Havana. Tests were made with the inmates of two specially-built rooms. One room was a model of hygienic system, but mosquitoes which had bitten yellow fever sufferers were admitted, and six out of the seven patients con-

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tracted the disease. The inmates of the other room occupied the same beds and wore the same clothing that had been used by yellow-fever victims, without any use of disinfectants. Although the only precaution taken was to exclude mosquitoes both day and night, not one person became ill. Thus was furnished positive proof that yellow fever is not contagious, but is spread by this particular mosquito. Tests have shown that it takes about two weeks after the mosquito is infected before it is able to convey the disease, indicating that the poison or germ undergoes special development in its body. See YELLOW FEVER.

There is another disease that this same mosquito is guilty of spreading, even more terrible than yellow fever because always incurable, although happily not so common. That is the repulsive affliction known as *elephantiasis*. After a mosquito has bitten a victim of this dreaded disease there is a period of three weeks before it is capable of passing on the infection. In some parts of the world the distribution of the disease is due to the agency of a certain species of the *Culex* mosquito.

The Tiny Mosquito and the Big Panama Canal. If it had not been for the destruction of the mosquito as a disease-carrier, it is doubtful whether the gigantic project of digging the Panama Canal could ever have been carried through. The greatest difficulty the French had to contend with in their attempt at its construction was the mysterious fever which carried off their workmen by the thousands. When the United States took over the task, the first thing the authorities put their hand to was sanitary work—making the Canal Zone a fit place in which to live. This required almost two years and cost millions of dollars. It was accomplished by Colonel (later Major-General) W. C. Gorgas, with the coöperation of the army, and its success has entitled him to equal honors with the great engineers who solved the purely mechanical problems.

Having learned the art of mosquito warfare during the yellow-fever fight in Cuba, Colonel Gorgas knew just what was needed. He and his "health squad" drove the mosquitoes out of the plague-ridden cities of Panama and Colon by a thorough campaign marked both by ambush and by open attack. They fumigated all ships, since mosquitoes are often carried by this means; they filled the drains, swamps and pools with the earth dug out of the canal; used petroleum to destroy the wrigglers in breeding places that could not be drained or emptied; installed modern sewer, garbage and water-supply systems; paved the streets; fumigated and screened the houses, killing all insects found indoors; and kept fever patients segregated, not necessarily from healthy people, but from mosquitoes. As a result of the vigorous measures enforced in the Canal Zone, the death rate from malaria and yellow fever is now actually lower than that of New York or Washington, and a mosquito is almost a curiosity. This conquest of the mosquito in the tropics is one of the great triumphs of the century. See GORGAS; PANAMA CANAL.

Campaign Methods and Weapons. The strongest weapon that can be used against the deadly mosquito is that of prevention, using the methods already discussed in connection with the campaign in Panama. This gets at the very root of the matter and is the only really satisfactory defense method. In addition to large-scale methods, however, it is necessary to educate the individual householder out of the careless habit of leaving rain-catching receptacles about the premises or in vacant lots. If the mother mosquito can find no near-by place to deposit her eggs, the problem is practically solved for that locality, as only a very small number of mosquitoes are carried by trains, boats, wagons or winds.

Against mosquitoes already hatched the chief weapon used is the oil can. If there is a thin film of kerosene over the surface of the water where they have hatched, the wrigglers are unable to project their breathing tubes through for the life-giving air, and thus drowning destroys a whole generation. It requires only a small amount of oil to film the surface—two tablespoonfuls (one ounce) for fifteen square feet—but the application needs to be repeated every two or three weeks during the mosquito season. This oil method, however, is only a protective measure, affording temporary relief. It cannot compare in effectiveness with the preventive method of destroying the breeding places altogether.

DRAGON FLY

A natural enemy of the mosquito. Do not molest it, for it is a beneficial insect.

The Mosquito's Natural Enemies. The dragon fly has acquired such a solid reputation as a mosquito foe that it has been nicknamed the "mosquito hawk." One of the best helps a community can have in its war on mosquitoes is a community

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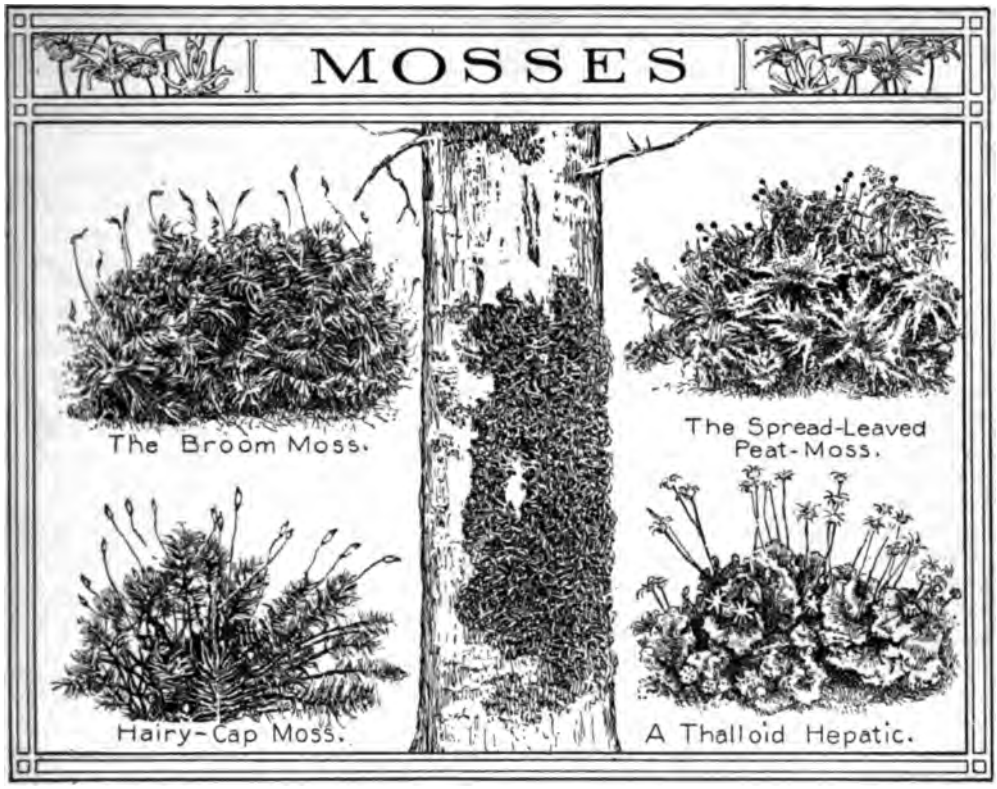


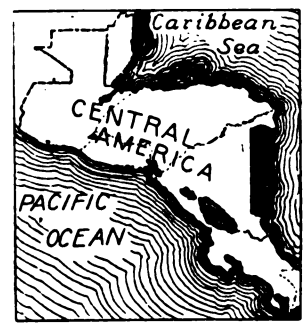
of these beautiful insects. Protecting them and encouraging their multiplication by artificial means is one of the plans now being developed. When fish are introduced into ponds and pools there is always a speedy decrease in the mosquito population; top minnows, sticklebacks, sunfish, bass, trout and baby perch are particularly good crusaders. The coöperation of frogs, toads, newts, turtles, bats and swallows is likewise worth encouraging. L.M.B.

Consult Howard's *Mosquitoes;* Mitchell's *Mosquito Life;* Ross's *Reduction of Domestic Mosquitoes.*

Related Subjects. The reader is referred to the following articles in these volumes:

Dragon Fly	Malaria
Elephantiasis	Pupa
Gnat	Yellow Fever
Larva	

MOSQUITO COAST, a district on the eastern coast of Nicaragua, extending along the Caribbean Sea for about 200 miles. From about 1655 to 1850 it was governed by a chief of the Mosquito tribe of Indians, but was under the nominal control of Great Britain. This region was for a time the subject of diplomatic controversy, as both the United States and the republics of Central America denied England's right to assume control. To avert any danger of war the Clayton - Bulwer Treaty (which see) was concluded in 1850 between the United States and Great Britain, but under a treaty ratified on August 24, 1906, the treaty of 1850 was annulled and Nicaragua was given the right to exercise absolute authority over the territory. It is now known as the department of Zelaya, and was so named for a Nicaraguan statesman. The chief town, which has about 5,000 inhabitants, is Bluefields. Population of the territory, about 15,000. See NICARAGUA.



LOCATION MAP

MOSS'ES, soft, green little plants, growing so close together that they make small green pads, or cushions. There are many hundred va-

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rieties, some found in every part of the world, often growing where no other plant life can exist, "covering with strange and tender honor the scarred disgrace of time." They belong to the flowerless group of plants, and are related to the liverworts (which see). The mosses have tiny stems and true leaves, and their spore-bearing cups almost always open by a little lid. In the hot sun some mosses curl their leaves to protect the upper surface from the drying heat; when they do this they look quite brown and dead, but showers and cooler weather bring back their fresh greenness. Some mosses are so influenced by the dampness in the air that they turn a different color with every change.

Mosses are soil makers. Their small roots, working slowly, break off tiny bits of rock and in time make dust of stone, just as fine as if it had been mashed with a hammer. The leaves gather dust particles from the air, and these, with the dead tissue of the plant, make the soil deeper where the moss grows. In Lapland, mothers line the baby's cradle with moss, for it is so soft and warm. Some of the birds line their nests with moss. Frontiersmen use it to chink the cracks between the logs of their cabins. It makes an excellent packing material, and in some places it is burned as fuel. In Ireland are great peat beds, swampy places where peat moss grows; by a gradual process of filling in and sinking, this forms a hard material known as peat, which is much used for fuel. See PEAT.

Mosses live generally in damp and shady places, but they are found also where it is dry and warm. Their roots hold the rain as it falls in the ground, instead of letting it run off, and by keeping the ground damp, they encourage other plants to come and live with them.

MOTH, a beautiful insect, of which there are many species, all resembling the butterfly in appearance. It is distinguished from the butterfly by the *antennae,* or feelers; in the butterfly these are clubbed, while in the moth they are feathery and usually terminate in a point, but are never clubbed. The wings, when at rest, are horizontal rather than at an angle with the body, and sometimes reach an expanse of six or seven inches, displaying in some species the most gorgeous coloring. In most cases, though there are exceptions to the rule, the wings of the moth have a peculiar fastening, resembling a hook and eye, which is not present in the butterfly, and the bodies of most moths are thicker than those of butterflies.

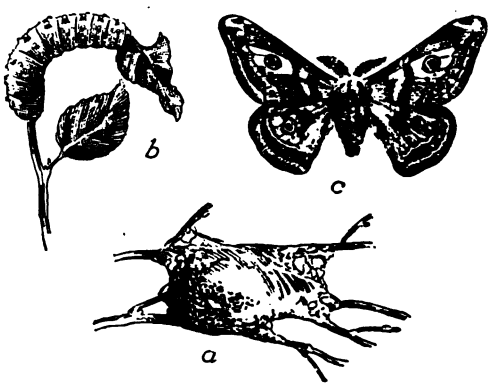
Moths usually fly by night, as they are attracted by lights, while butterflies fly by day. The common, small white, mealy moth is called a *miller.* Another small moth, known as the *clothes* moth, is inconspicuous as to color, but very destructive to woolen fabrics.

Another variety of moth is found in the tropical countries and resembles the bee and the

MOTH AND BUTTERFLY

At left is a moth, at right a butterfly. The points of similarity can easily be noted in these two specimens. Not all moths so closely resemble the butterfly.

wasp. The moth known as the *silk-moth* is the only one of direct use to man, though a large number are of importance in destroying fruits, grains and vegetables when in their larval (young) state.



THE MOTH

The moth undergoes a complete metamorphosis. In the illustration all but the egg stage is shown; *b* is the grub, or larva; *a* is the cocoon, which encloses the pupa, and *c* is the adult moth.

Consult Holland's *Moth Book;* Dickerson's *Moths and Butterflies.*

Related Subjects. The following articles in these volumes will give much information on this interesting subject:

Antennae	Gypsy Moth
Brown-Tail Moth	Insect
Butterfly	Larva
Caterpillar	Metamorphosis
Chrysalis	Silk
Cocoon	Sphinx Moth
Codling Moth	Tussock Moth
Death's-Head Moth	

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MOTHER GOOSE. Who Mother Goose was, not even the wisest man can say; but what she did for children, the smallest prattler in the nursery knows. They would miss something, indeed, were they deprived of "Ride a cockhorse," or "This little pig went to market," or "Hickery-dickery-dock." Where would they get their very first idea of rhythm and rhyme, where find their earliest "pieces" to speak, if Mother Goose had not left them "Little Boy Blue" and "Little Bo-Peep" and "Jack and Jill?" As nobody can say just who wrote these fascinating jingles, so nobody can explain exactly the charm which they have for children, but every child can feel it. It is different from the feeling roused by any other rhymes, no matter how simple, and almost any grown person who has been fortunate enough to be brought up on *Mother Goose Melodies* can, by repeating one of them, think himself back to the days in the toy-strewn, fire-lit nursery.

History. One thing that a child cannot realize is how many thousands, or even millions, of children have smiled and clapped their hands over the merry little verses; not just children in America, but in England as well; while the children in France and in Germany and in Russia have them, too, but in languages which children here could not understand. Nor is it only big brother or father or even grandfather when they were little who heard the *Mother Goose Rhymes;* children in England hundreds of years ago, before a white man came to America, knew and loved them, too. Perhaps, wonderful as it may seem, the little Shakespeare heard them, for some of them were certainly known in his day; perhaps their swinging music stayed in his head and when he grew up helped him to write the cheerful little songs which are found here and there in his plays.

Only in his day they were not printed in big picture books; they were not printed at all, or even written, but children learned them from their parents and passed them on to their own children, and so the verses lived. Finally it occurred to someone that they were worth printing, and in 1760 they appeared in London in a little book that would seem very unattractive to the children of to-day. Where the title came from no one can be sure, but it was probably taken from the name of Queen Goosefoot, a kindly personage in French legend who had a special fondness for children. More than sixty years before the *Mother Goose Melodies* appeared in London, a Frenchman, Charles Perrault, had used the name *Mother Goose* for a book which had in it such delightful stories as *Little Red Riding Hood, Puss in Boots, Cinderella, Beauty and the Beast* and *The Sleeping Beauty.* Since the first *Mother Goose Melodies* came out, there have been copies printed too numerous to count; never a Christmas season draws near without the bookstores placing in their windows new copies, each one more beautiful than the last.

Mother Goose Up to Date. Once in a while some very careful people declare that there are things in *Mother Goose* which ought to be changed; and they set at work to change them. A child shouldn't read, they say, of the lady who borrowed Dapple Grey and "whipped him and lashed him and rode him through the mire," so they change it to "she fed him, she petted him, she kept him from the mire," while of "Tom, Tom, the piper's son" who "stole a pig and away he run," they make a gentle boy:

> Tom, Tom, the piper's son,
> Picked a flower, and away he run;
> The flower was sweet
> And Tom was neat,
> And he went smiling down the street.

But these changes do not seem to appeal to average children. They want the fun of the old rhymes, even if it is sometimes a little rough; they prefer the squeal of the stolen pig to the scent of the dainty flower. Probably there cannot be found on record a child whose morals have been in any way injured by the frolicsome Tom or by the delightful Taffy, who "came to my house and stole a piece of beef." A.MC C.

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MOTHER-OF-PEARL, or **NACRE,** the hard lining of shells of certain sea animals, such as the oyster, varying in color from pale grayish-blue and pink to deeper purple and green. Such shells are found off the coasts of tropical countries, particularly around the South Sea Islands, Panama, Cuba, Manila, Lower California and Australia, and are used extensively in the manufacture of pocketknives, buttons, beads, umbrella handles, and for inlay in fancy boxes and furniture. Long ago the South Sea Islanders used mother-of-pearl to make their fishhooks. This beautiful substance is excreted in exceedingly thin layers by the animal within the shell, and when it is the product of the larger mollusks is sometimes found in circular pieces a foot in diameter. See PEARL.

MOTHERS, NATIONAL CONGRESS OF. See NATIONAL CONGRESS OF MOTHERS AND PARENT-TEACHER ASSOCIATIONS.

MOTHER SHIPTON, an English peasant woman, locally believed to be a witch and prophetess, who is said to have lived in Yorkshire about the middle of the fifteenth century. Even when she was a child she was so ugly looking, with her small, fiery eyes and misshapen face, that the people called her "the child of the Devil." As she grew older her prophecies and perhaps her sharp tongue made her much feared. Her best-known prophecy is in a short, singsong poem that appeared about fifty years after her death. In it she said that "carriages without horses shall go" and that men would be seen in the air, which seemed prophetic of the automobile and flying machine; she also hinted at the French Revolution and the discovery of America. In 1881 a rumor spread that Mother Shipton had prophesied the end of the world that year, and many of the peasants were so frightened that they spent the appointed night praying in fields and churches.

MOTHERS' PENSIONS, the term generally applied to allowances made by the government for the support of mothers with dependent children. The fundamental purpose of such an allowance is to prevent the separation of the children from their mother because of poverty, or, in other words, to enable mothers who would not otherwise be able to do so to provide homes for their children. Although the existing legislation on the subject shows a great variety of details, the principles are nearly uniform. First of all, the mother must be in actual need, and under some laws she must actually be destitute. She must be a fit person, both physically and morally, to care for her children, and she must give most of her time to doing so. This means that under ordinary conditions she must not be regularly employed away from home. Furthermore, if she is receiving a pension, she must maintain a certain standard of living if she wishes to continue to receive it.

The first mothers' pension law was passed by Missouri in 1911; this law applied only to Jackson County, in which Kansas City is located. The bill passed in Missouri in 1915, extending the mothers' pension act to all counties, was vetoed by the governor and so failed to become a law. Illinois, in 1911, passed the first comprehensive law on the subject, and was followed in 1912 by Colorado. To-day more than one-half of the states of the American Union have more or less comprehensive acts providing mothers' pensions. In some states the law applies only to widows, or to those whose husbands are incapacitated in mind or body; in others to mothers deserted by their husbands, and in a few states also to divorced or unmarried mothers. The pension given to each mother depends on the number of her children. For the first child in California the rate is $12.50 a month ($6.25 by the state and a like amount by city or county); the amount is $2 a week in Iowa and $3 a week in Michigan; it is $15 a month in Illinois, Ohio, South Dakota and Washington. The mother is entitled to an amount varying from $5 to $12 a month for each additional child. The maximum age of a child for whom a pension may be received ranges from fourteen to eighteen. In most states the pensions are paid through the juvenile courts, but in a few cases through the regular county or other courts, and in one state, Massachusetts, through the local overseers of the poor. J.C.L.

MOTION, LAWS OF. See DYNAMICS.

MOTIVATION, *mo tiv a' shun,* **OF TEACHING.** See TEACHING, MOTIVATION OF.

MOTLEY, *mot'li,* JOHN LOTHROP (1814-1877), an American historian and diplomat, remembered chiefly for his historical works on the Netherlands, the *Rise of the Dutch Republic* and *History of the United Netherlands.* He was born in Dorchester, now a part of Boston, and entered Harvard College when only thirteen. After his graduation in 1831 he studied at the universities of Göttingen and Berlin. He became intimately acquainted with Bismarck, with whom his friendly relations were continued in after life. On his return to America he studied law but soon ventured into literature, publishing a novel, *Morton's Hope,* in 1839. In 1841 he was appointed secretary of the Ameri-

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can legation at Saint Petersburg (Petrograd), but resigned the office after a brief period.

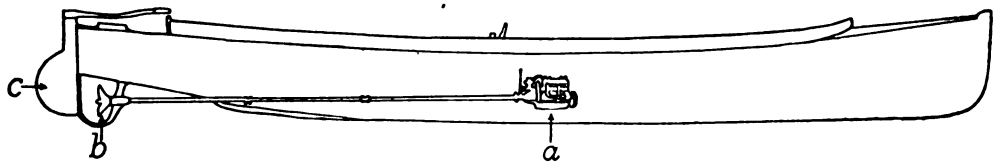
A second novel, *Merry Mount,* a romance of the Massachusetts colony, was published in 1849, after which he decided that history, rather than fiction, was his chosen pursuit. In 1858 he went to England, where he received the degree of D. C. L. from Oxford. He was appointed American minister to the court of Saint James in England in 1869 by President Grant, but was recalled, for unexplained reasons, the following year. The last of his historical works, *The Life and Death of John of Barneveld,* published in 1874, was a rounding-out of the volumes previously written concerning the life history of the Netherlanders. Motley's scholarly treatment of his subject, his brilliant and picturesque style, and the spirit of liberty that animates his works give him rank among the most distinguished of American historians.

JOHN L. MOTLEY

MOT'MOT, a handsome bird with plumage of blue, green and cinnamon, having the tail feathers much elongated and ending in racket-shaped tips. It is found in the western continents from Mexico to Brazil, and is sometimes called the *hoo-hoo,* from its cry. It is a bird of solitary habits, living only with its mate and keeping to gloomy forests. Its nest is built in a round hole at the end of a tunnel about six feet in length, excavated in banks along streams. The eggs are a glossy white or cream color, and number three or four. These birds are related to the kingfisher (which see). They feed on insects, reptiles and fruits.

MOTMOT

MOTOR, *mo'ter,* **BOAT,** a small boat propelled by an internal combustion engine or by electricity. Motor boating has been styled "automobiling on the water," and originally all motor boats were constructed for pleasure. Their popularity is due to the perfection of the gas engine (which see). Small pleasure boats are from twenty to forty feet, and large ones from forty to sixty-five feet in length. A small boat with a 12-horse-power engine may have a speed of ten miles an hour; with a 20-horse-power engine it may have a speed of sixteen to eighteen miles. Racing boats and large pleasure boats have more powerful engines. The best racers often attain a speed of thirty to thirty-five miles an hour, and a few boats have exceeded forty miles for short distances. The average pleasure boat, however, has a speed varying from five to ten or twelve miles an hour.



MOTOR BOAT
Showing location of engine (*a*), propeller (*b*), and rudder (*c*).

The essential parts of a motor boat are the boat, the motor, the fuel tank and the steering apparatus. The boat is so constructed that the bow is narrow and does not sink far into the water. The motor is placed low down and firmly fastened to the boat so as to give firmness and ballast to the entire structure. The propeller shaft slants downward, and may be attached directly to the motor, connected with it by a clutch. The motors are reversible, so that the boat can be moved forward or backward. The fuel tank is placed in the bow high enough above the motor to enable the fuel to flow to the cylinders without the use of a pump. The steering apparatus should be firmly attached to the boat, and easy to operate.

In the newest patterns of large pleasure boats the automobile type of engine is used and the steering apparatus is operated by a wheel similar to that used for steering the automobile. The space for passengers is often luxuriously furnished and a folding canopy enables the occupants to be protected from wind and storm.

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A number of small, inexpensive motors so constructed that they can be attached to a rowboat or a canoe are on the market. By use of such a device any rowboat with a keel and rudder can quickly be converted into a motor boat that can be operated by any boy or girl old enough to row.

Commercial Uses. Although the motor boat was first designed for pleasure, its advent has had a marked influence on water transportation. It has nearly driven the small steamboat from the water, because the motor is much

MOTOR ATTACHMENT
A recent invention which converts an ordinary rowboat into a motor boat.

lighter, less expensive to operate, and because no licensed engineer is required. Moreover, lightening the weight enables boats propelled by the gas engine to navigate waters too shallow for a steamboat. For these and other reasons we find many small ferries and excursion boats in harbors and on lakes to be propelled by gas engines. The motor has also replaced the sail on most ocean fishing boats. The motor enables the fishermen to follow the fish, and to market their catch without depending upon the wind. In lobster fishing and oyster dredging this type of boat is also in general use.

History and Classification. A motor boat was exhibited at the Paris Exposition in 1889, and at the World's Fair in Chicago in 1893 a number of electric launches were in operation. The power for these launches was supplied by a storage battery; but the weight of the battery and the inconvenience of charging it made these launches impracticable, except in certain localities. A naphtha launch in which naphtha was used for fuel was developed at about the same time; but as the gas engine was perfected, the advantages of this style of motor brought it into general use.

Four classes of boats driven by internal-combustion engines are recognized: (1) the pleasure launch, from twenty to thirty feet long; (2) speed boats; (3) the hydroplane, a type of speed boat partially supported in the water by planes attached to the hull; (4) the cruiser, which is virtually a pleasure yacht, sixty-five or more feet in length. W.F.R.

Consult Russell's *Motor Boats: Construction and Operation;* Hartford's *The Motor Launch: How to Build and Run.*

MOTORCYCLE, *mo' ter sy k'l,* a bicycle equipped with a motor. The engine, which is driven by gasoline, is constructed after the simplest design and made as light as possible. The first really successful machine was perfected in 1900, and the motorcycle is now so dependable that it is used for dispatch carrying in war, police service in cities, touring over country roads and other hard service. At the present time there are about fifty different makes of motorcycles on the American and Canadian markets. Many improvements have been added in the past decade, increased speed, comfort and durability being the qualities considered. The standard type is a 7-horse-power machine; those provided with levers giving two rates of speed are now generally regarded as superior to the single-speed type of machine. They will run from fifty to ninety miles on a gallon of gasoline, but the latter mileage can be achieved only under favorable conditions.

In the earlier experiments with motor-driven bicycles a belt was sometimes substituted for the chain drive. The belt is retained by some manufacturers, but the more recent tendency has been to restore the chain and to enclose it in a dust-proof case. Engines are of two types, single or twin cylinder, the twin cylinder predominating in the newer models. Magneto ignition is standard, and the machine is oiled by a mechanical pump. The automatic-ratchet type of engine starter has gained in favor.

Manufacturers are now concentrating their attention largely on increasing the comfort of operation. Cradle-spring frames and forks to absorb shocks have been introduced, and the footboards have been readjusted so as to form a natural leg rest. To lessen leg cramp, the wheel base is now lengthened. Not the least important improvement has been the installation of larger gasoline tanks, which make a wide range of travel possible. In fact, the tendency has been to give to the motorcycle as many of the advantages of the automobile as possible, and it may some day compete successfully with

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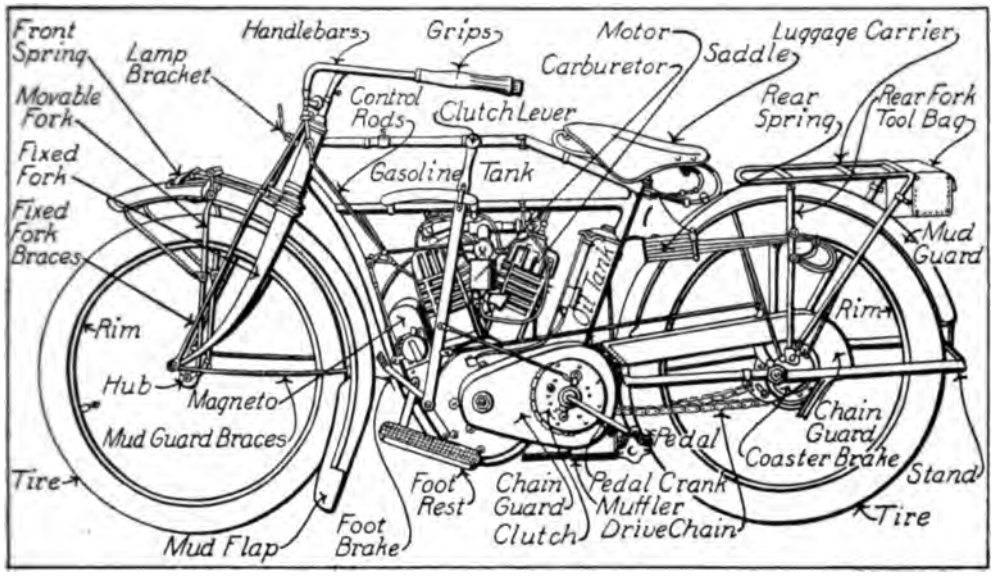

PARTS OF A STANDARD MOTORCYCLE

the larger machines. The cost of motorcycles varies from $125 to $275.

The original form of the motorcycle of today was a steam-propelled velocipede invented in 1868. The boiler was suspended back of the seat in the center of the machine, and the piston rods were directly connected with cranks on the rear wheel. The idea was crudely carried out, but the principle involved was the same.

Racing. Mortorcycle racing has never achieved the great popularity that bicycle racing once enjoyed, but it has a loyal, if a smaller, following. The small tracks with sharp turns on which such races are often run, together with the great speed of the machines, make motorcycle racing a most thrilling sport. Unfortunately, drivers are frequently killed or maimed. Long-distance races are the commoner sort, since they afford a better test of the reliability of a machine and the skill of a driver. The record for one mile is 36 seconds; for 10 miles, 6 minutes 6⅛ seconds; for 50 miles, 33 minutes 55⅕ seconds; and for 100 miles, 1 hour, 8 minutes, 1⅘ seconds. The distance from New York to San Francisco, 3,362 miles, has been covered in 11 days, 11 hours and 10 minutes. G.B.D.

Consult Pagé's *Motorcycles, Side Cars and Cyclecars,* also his *Motorcycle Troubles Made Easy.*

MOTT, Lucretia Coffin (1793-1880), an American reformer and leader in the woman's-rights movement. She was born on Nantucket Island and educated in a school for Friends near Poughkeepsie-on-Hudson, N. Y. In 1818 she married James Mott, a teacher. As a leader in the Society of Friends she became noted for the refinement and eloquence of her discourses. When the Society of Friends divided into two factions in 1827, she and her husband joined the Hicksite, or liberal branch. She was one of the early Abolitionists and assisted in forming the American Antislavery Society for women in Philadelphia in 1833; in 1840 she was chosen a delegate to the World's Antislavery Convention in London, but was not allowed to take her seat on account of her sex. This action had an important influence in launching the woman's-rights movement, which was formally started by Mrs. Mott and Elizabeth Cady Stanton at a convention held at Seneca Falls, N. Y., in 1848. Mrs. Mott was president of the Pennsylvania Peace Society; she took a deep interest in colored people, and to the end of her life was actively interested in the promotion of temperance and in the elevation of women. See Abolitionists.

MOULD, the English form of the word Mold (which see).

MOULTRIE, *mohl'tri,* William (1731-1805), an American military leader in the Revolutionary War, famed for his brilliant defense of Charleston, S. C., in June, 1776. He was born in England, but early removed to South Carolina. He was captain of a regiment in the Cherokee disturbance of 1761, in 1775 he be-

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WORK OF THE MOUND BUILDERS

(1) Mound, or circle, in Greenup County, Kentucky; (2) Mound with moat or encircling wall (diameter, 100 feet), West Virginia; (3) Serpent mound (500 feet long), Adams County, Ohio; (4) Cahokia mound (998 feet long, 99 feet high), Illinois; (5) Great mound, Marietta, Ohio; (6) Alligator mound, Licking County, Ohio; (7) Curve of hill and cross section of (6).

came a member of the Provincial Congress of his state, and was made colonel of a South Carolina regiment the same year. In March, 1776, he erected a fort on Sullivan's Island, commanding the entrance to the harbor of Charleston, and in recognition of his successful resistance to the attacks of the British army, under Admiral Sir Peter Parker, Congress gave the fort his name. He was shortly after made a brigadier-general, and in 1779 again defeated the British at Beaufort. On the surrender of Charleston, in 1780, Moultrie was taken prisoner, but was afterward exchanged for Burgoyne. In 1785, and again in 1794, he was elected governor of South Carolina.

MOUND BIRD, a bird belonging to the same group as the domestic fowl, whose name refers to its curious habit of building a large mound in which to hatch its eggs. This bird usually scratches up with its large feet a huge mass of grass, leaves and turf; in this heap the eggs are laid and hatched, the mound forming a crude incubator which is heated by the decaying of the vegetable matter. It is supposed that the young, on emerging from the eggs, dig their way out through the side of the mound. As soon as they leave the nest they are able to fly and to shift for themselves. The eggs are white when freshly laid, and are of unusual size, being from three to four inches long. The same mound is used season after season, and as fresh material is added at breeding time, the older nests are often of huge size.

The mound birds dwell along the seacoasts and on the banks of streams in Australia and the neighboring islands. They are modestly garbed in dull-colored plumage, and vary greatly in size. The smallest are about as large as a small fowl; the larger attain the size of a small turkey. All have unusually large feet, similar in structure to those of the pigeon. These birds are commonly known in Australia as *jungle fowl;* a familiar species inhabiting New Guinea is known as the *brush turkey*. The flesh of the mound bird is used as a table food.

MOUND BUILDERS, the name given to people, supposedly of the Stone Age, who preceded the Indians in North America. Chiefly because of differences in the formation of the skull, the Mound Builders are generally believed to have been a race separate and distinct from the Indians, and not their ancestors. The Mound Builders get their name from the fact that it was they who built the curiously-shaped mounds of earth which are scattered all over the United States but are especially numerous in the valleys of the Mississippi River and its branches. It is only by these mounds that we possess any knowledge of the people. Both Mound Builders and Indians are known by the general term *Amerind.*

It is estimated that there are more than 10,000 of these earth mounds in Ohio alone. They are of all sizes and shapes—circular, square and even eight-sided. The very large mounds are interesting because they represent an immense amount of labor. This means that the people who built them must have settled in that section for a considerable period, although they are believed to have been, very largely, a wandering race. One of the largest, Grave Creek Mound, in West Virginia, is about seventy feet high and 900 feet in circumference. Two human skeletons found deep underneath this mound indicate that it was built as a burial monument.

A mound at Cahokia, Ill., rises up in terraces to a height of ninety feet and covers about

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twelve acres of ground. Another mound in Ohio is about 200 feet across and is surrounded by a ditch thirteen feet wide, evidently a fortification of some sort. This mound is shaped like a great snake, with its tail coiled and its jaws wide open. It is more than a quarter of a mile in length; the body is thirty feet wide and the wide open jaws are seventy feet across. In Wisconsin there are a large number of mounds shaped like serpents, birds and animals—buffalo, elk, moose, deer, wolves and panthers. Some of the panthers have tails 350 feet long and some of the eagles, the "thunder birds" of the old Indian legends, measure 1,000 feet from tip to tip of wing.

MAP OF DISTRICTS

In the various regions inhabited by the Mound Builders their mounds appear to have been constructed for different purposes. The best authority classifies them as follows:

(1) Effigies
(2) Rock Effigies
(3) Stockades
(4) Enclosures, altars, etc.
(5) Stone graves
(6) Lodge circles
(7) Pyramids
(8) Beehive tombs
(9) Shell mounds

These mounds were obviously built for a number of different purposes—some for fortifications, some for altars and some for monuments, while others were simply the foundations for houses. It is believed, also, that they were built by a great number of wandering tribes throughout a long period of time. All of the relics found within and around these mounds tell their story of the people who used them. The sharp flint axes and hatchets tell us that the Mound Builders were able to cut down trees and shape and work the wood. The arrowheads and hunting knives and sharp bone needles tell us that they killed and skinned wild animals, ate their flesh and used their pelts for clothing. Their hoes and spades and household utensils disclose their practice of agriculture. The ornaments of beaten copper and iridescent shell, ornamented with drawings and carvings, tell us that these savage tribes had developed some feeling for beauty, too.

Mines and stone quarries from which they got materials for their weapons, utensils and ornaments have been discovered in several places. On Isle Royale, in Lake Superior, there is a copper mine which was worked hundreds of years before Columbus discovered America. The abandoned pits and trenches of this mine were filled with rude mining tools made of chipped stone. A flint quarry was discovered in Arkansas from which thousands of cubic yards of stone had been taken with no other

FOUND IN THE MOUNDS

(a) Flint hoes from Tennessee
(b) Cloth from Ohio
(c) Pottery from Arkansas
(d) Eagle pipe from Ohio
(e) Pottery from Missouri
(f) Pottery with salamander from Ohio
(g) Pottery from Iowa

implements for the work than those which had been chipped from the rock which they later splintered. Another quarry in the Indian Territory had furnished them with a chalky kind of flint from which they made beautifully-shaped hoes and other tools and long, slender knives. A third quarry in Ohio supplied a beautifully fine-grained flint for spear- and arrowheads.

From where the Mound Builders came, how long they occupied American territory, and their ultimate fate are unknown. A.C.

Consult Nadaillac's *Prehistoric America*

MOUNDSVILLE, *mounds'vil,* W. VA., a thriving manufacturing and shipping center and the county seat of Marshall County, situated on the west side of the narrow strip of the state which extends north between Ohio and Pennsylvania. It is on the Ohio River, twelve miles south of Wheeling, with which it is connected by an electric railway, and is on the Baltimore & Ohio Railroad. Its population was 8,918 in 1910, and 11,153 in 1916 (Federal estimate). The area exceeds two square miles.

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The most interesting feature of the city is a cone-shaped mound seventy-five feet high, a relic of the Mound Builders (which see). When excavated in 1838 it was found to contain burial vaults, skeletons and copper ornaments. The city has a Federal building, courthouse and Reynolds Memorial Hospital, and is the seat of the state penitentiary. It is a commercial center of the surrounding agricultural and coal-mining region, and has important manufactories of glass, enameled ware, foundry products, leather, flour and feed, lamps, metal ceilings, clothing, cigars and other commodities. The town of Moundsville was platted in 1831 a short distance from Elizabethtown, the older settlement. The two places were united under the name of Moundsville in 1866.

MOUNTAIN, *moun'tin,* a huge elevation of the earth's surface, constituting the noblest feature of the landscape. In structure a mountain is either a fold in the rocky envelope of the globe, or a mass of immense blocks of stone, broken and partly upturned. Mountains usually occur in systems, which are often of great extent, several of the more imposing exceeding 4,000 or 5,000 miles in length.

Mountains speak to the scientist of the gigantic grindings and twistings which the earth's crust underwent in very ancient periods. Sometimes they resulted from a single fold, sometimes from several. But the majestic peaks of the Alps were produced by a less regular upheaval, for the strata are crushed and broken as if they had been crumpled in a Titanic fist. The process of folding is usually very slow, as is proved by the fact that rivers flowing across the folds will often cut their channels downward quite as fast as the rock is pushed upward. Lofty systems are thus traversed by streams, which would have been turned aside if they had dug their channels more slowly. Mountains usually show a core of granite covered with strata of sedimentary rock. Not all ranges are formed by folding. The ridges in the Great Basin of the United States, for example, are composed of great blocks of sedimentary rock that have been crushed and tilted. Still others are of volcanic origin.

The loftiest mountain in the world is Mount Everest, one of the Himalayan range, which is 29,002 feet above sea level. The elevation of mountains is usually determined by the barometer, by noting the boiling point of water as it is carried upward, or by the use of surveying instruments and computations in trigonometry. The last is the most scientific method.

Consult Geikie's *Mountains, Their Origin, Growth and Decay;* Suess's *The Face of the Earth.*

Related Subjects. The following important mountain ranges and individual peaks are described under their proper headings in these volumes:

AFRICA

Atlas	Kilimanjaro

ASIA

Altai	Kuen-Lun
Ararat	Lebanon, Mountains of
Caucasus	Nebo, Mount
Elburz	Olives, Mount of
Everest, Mount	Stanovoi
Fujiyama	Tabor, Mount
Ghats	Taurus
Himalaya	Tian-Shan
Hindu Kush	Ural
Karakorum	Yablonoi

EUROPE

Alban	Jungfrau
Alps	Jura
Apennines	Matterhorn
Athos, Mount	Mont Blanc
Ben Lomond	Monte Rosa
Ben Nevis	Olympus
Black Forest	Parnassus
Carpathian	Pyrenees
Caucasus	Riesen-Gebirge
Cenis	Saint Gotthard
Cevennes	Sierra Nevada
Cheviot Hills	Ural
Etna	Valdai Hills
Grampian Hills	Vesuvius
Harz	Vosges
Helicon	

NORTH AMERICA

Adirondack	Laurentian Plateau
Alleghany	Logan, Mount
Appalachian	McKinley, Mount
Assiniboine, Mount	Ozark
Berkshire Hills	Pike's Peak
Black Hills	Popocatepetl
Black Mountains	Rainier, Mount
Blue Ridge	Rocky
Cascade Range	Saint Elias
Catskill	Selkirk
Coast Range	Shasta, Mount
Columbia	Sierra Madre
Cordillera	Sierra Nevadas
Cumberland	Stone Mountain
Green	Taconic
Holyoke, Mount	Uinta
Hood, Mount	Wasatch
Hooker, Mount	White
Iron Mountain	Whitney, Mount
Katahdin	

SOUTH AMERICA

Aconcagua	Cordillera
Andes	Cotopaxi
Chimborazo	

The following general articles will also be of interest:

Barometer	Hill
Erosion	Volcano
Geology	

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MOUNTAIN ASH, a tree belonging to the rose family, widely known throughout Europe and America. It bears crisp, green leaves, clusters of white flowers and red berries, and in the wild state seems to prefer a home in cold, unprotected mountainous places. It is sometimes found as a shrub, and rarely grows taller than thirty feet. Although it is ornamental its hard wood is useful for handles of tools and implements that are manufactured from the wood, and the scarlet berries which cling to its branches throughout the winter often furnish the chief food for the birds at that season. In Europe the mountain ash is known as the *rowan tree.*

MOUNTAIN LAUREL, *law'rel,* a species of kalmia, an evergreen shrub of the heath family, described under the title KALMIA.

MOUNT ALLISON UNIVERSITY, an institution for higher education, located at Sackville, N. B. By its charter the ultimate ownership of the university is vested in the General Conference of the Methodist Church of Canada. The direct management of its affairs is in the hands of a Board of Regents, which is also the supreme governing body of Mount Allison Ladies' College and Mount Allison Academy, affiliated institutions. Twenty-four of the regents are selected by the General Conference, eight by the Alumni Society, and four by the Alumnae Association of the Ladies' College. Twelve of the regents and the members of the faculty comprise the Senate, which controls educational matters, such as the framing of courses of study and the conferring of degrees. In its internal administration the university is strictly nondenominational, and many of its students, who number about 250, are not Methodists. Mount Allison was the first chartered college in Canada to admit women to all the privileges of regular courses and degrees.

Mount Allison was named for Charles F. Allison (died 1858), a resident of Sackville.

MOUNT CARMEL, PA., is a city of Northumberland County, in the rich anthracite coal fields in the east-central part of the state. It is 129 miles northwest of Philadelphia and seventy-one miles northeast of Harrisburg, and is on the Northern Central, the Philadelphia & Reading and the Lehigh Valley railroads. The population, about one-third foreign born, in 1910 was 17,532; in 1916 it was 20,268 (Federal estimate).

Coal mining and shipping are the principal industries. There are manufactories of miners' supplies, cement blocks, shirts and cigars; there are also silk and planing mills, a packing plant, foundries and machine shops and wagon works. Mount Carmel was incorporated as a town about 1848, and was chartered as a borough in 1862. H.J.K.

MOUNT DESERT, a mountainous island, abounding in beautiful lakes, fourteen miles long and seven miles wide, in the Atlantic Ocean off the southern coast of Maine, forming part of Hancock County. It is a very popular resort for summer visitors. Green Mountain, the highest point on the island, rises to a height of 1,535 feet. There are three convenient harbors, Bar Harbor, Northeast and Southwest, and many small towns and villages, the most noted being Bar Harbor. The latter is one of the most exclusive summer resorts in the United States.

The island was discovered by Champlain and settled by French Jesuits in 1608, their settlement, Saint Lawrence, being destroyed by an expedition from Virginia in 1616. Somerville, the oldest village on the island, was settled by the English in 1761. The permanent population is not quite 2,000.

MOUNT HOLYOKE COLLEGE, at South Hadley, Mass., one of the first colleges for women established in the United States. The institution was founded by Mary Lyon (which see) in 1837, as Mount Holyoke Seminary and College. It has borne its present name since 1893, when the seminary charter was given up. The purpose of its founder was to make it possible for girls of moderate circumstances to receive college training. Most of the students live in dormitories on the campus, where board and lodging may be obtained for $275 a year. The degree of B. A. is given to those completing two years of prescribed and two years of elective work. With college property valued at $2,256,000, and productive funds amounting to over $1,480,000, Mount Holyoke takes high rank among American colleges for women. The library, which has the use of a permanent fund of $10,000, an income increased by annual appropriations, contains over 58,000 volumes. The college has a faculty of about ninety, and a student enrolment of nearly 800. It is the special object of Mount Holyoke College to combine with high scholarly ideals a strong influence for Christian character.

MOUNT STEPHEN, GEORGE STEPHEN, First Baron (1829-), a Canadian financier and railway promoter, first president of the Canadian Pacific Railway, whose completion was due in a large measure to his energy, foresight

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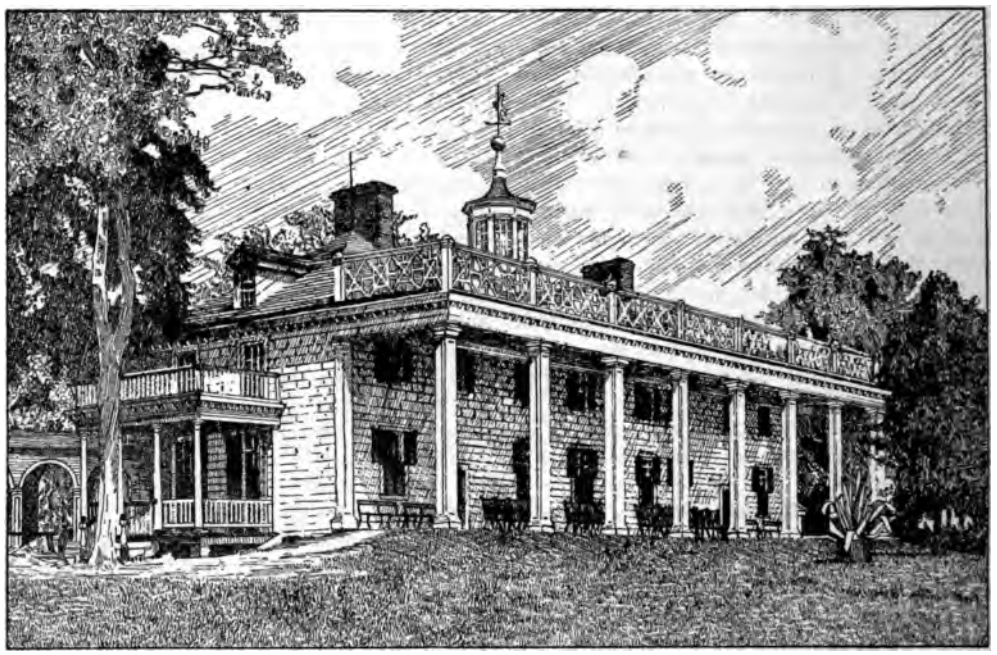

THE HOME OF GEORGE AND MARTHA WASHINGTON

and faith in the future of Canada. Lord Mount Stephen was born at Dufftown, Banffshire, Scotland, but emigrated to Canada in 1850. He entered the employ of his uncle, who conducted a dry-goods establishment in Montreal, later became a partner, and after ten years purchased his uncle's entire interest. The firm expanded and engaged largely in the manufacture of woolen goods. Mount Stephen became very wealthy and extended his influence into other lines of industry. He was president of the Bank of Montreal from 1876 to 1881, and at the same time was successful in starting railways in Manitoba and Minnesota. From its organization until 1888 he was president of the Canadian Pacific Railway, in the construction of which he risked a large fortune. Its successful completion and operation greatly added to his wealth, of which he has since given freely for philanthropic purposes. One of his largest gifts was a donation of $500,000 for the Royal Victoria Hospital at Montreal. In recognition of his services in connection with the construction of the Canadian Pacific Railway, he was created a baronet by Queen Victoria in 1886, and in 1891 was raised to the peerage as Baron Mount Stephen. His title is taken from a peak in the Rocky Mountains which was named for him. In 1914 a statue of him was placed in the new Windsor station of the Canadian Pacific Railway at Montreal, to remind the people of the man whose financial and organizing genius linked the Atlantic and the Pacific with a band of steel.

LORD MOUNT STEPHEN

MOUNT VERNON, a shrine of American patriotism, beloved and sacred because of its associations with Washington, for it is memorable as the residence and the burial place of the "Father of His Country." The mansion house is situated on a high bluff overlooking the Potomac River, in Virginia, fifteen miles below Washington, D. C. It was the dearest place on earth to George and Martha Washington. Here Washington conducted his farm until called to command the Continental army; to Mount Vernon he returned after the Revolution and again after his terms as President; and here he lived happily in brief retirement as a private citizen until his death. In the unpretentious tomb near by this devoted couple were buried, the coffins being hewn from the

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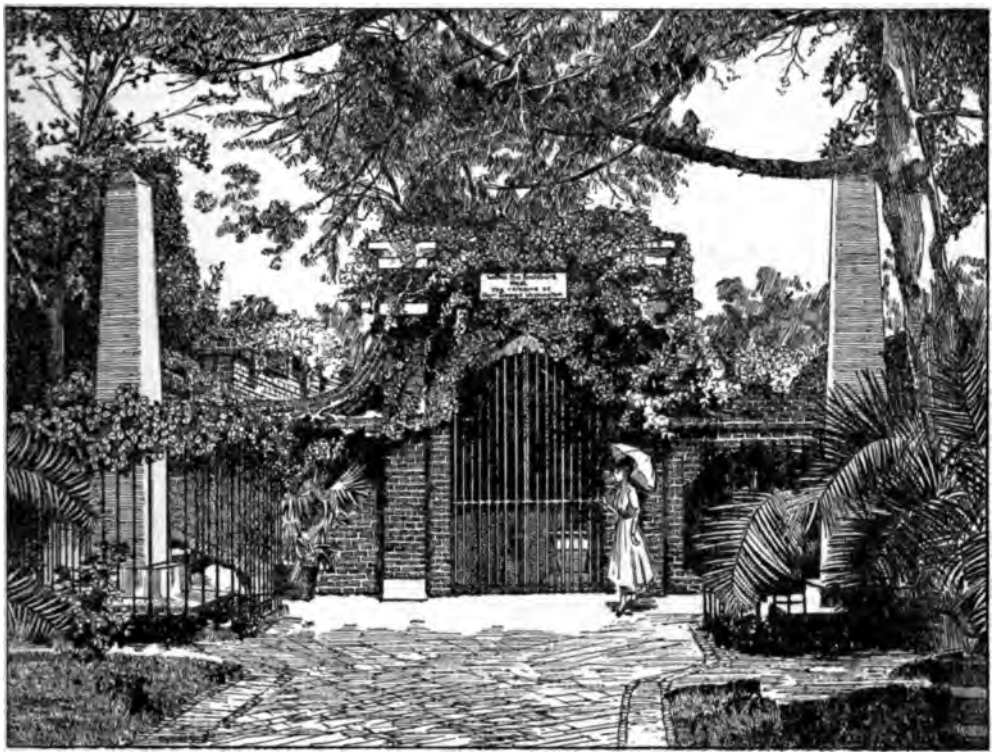

TOMB OF THE WASHINGTONS

same block of stone. Upon these England's great Foreign Secretary, Arthur J. Balfour, deposited floral tributes in 1917.

The mansion house is of wood, painted to resemble stone. It has two stories and an attic of dormer windows. Shaded lawns surround the home. There is a deer park under the hill, and to the rear are beautiful flower gardens and orchards. Disposed about the grounds are the usual outbuildings of a Virginia farm. Many of the trees which Washington cared for are still flourishing.

The mansion was built in 1743 by Washington's brother Lawrence, and was named after Admiral Vernon of the British navy. In 1856 the house and the surrounding property were saved from the auctioneer's hammer, and secured as a national possession by the Ladies' Mount Vernon Association. Portions of the original estate which had been sold were acquired again; buildings which had fallen into ruin were restored; the mansion was repaired, many articles of furniture and adornment were restored to the several rooms; and numbers of valuable relics and mementos of George and Martha Washington and of their times were placed in the house. To care for the mansion and grounds there was perfected a permanent organization, consisting of a regent and a vice-regent for each state in the Union. Thus the peaceful, lovely spot, upon which the memory of Washington sheds an eternal glory, has been preserved to a loyal posterity because of the courage and patriotic impulse of the women of America.

Excursionists from Washington to Mount Vernon are charged two dollars for the round trip by automobile companies, but electric street cars run from the national capital for a very small fare.

Consult Page's *Mount Vernon and Its Preservation.*

MOUNT VERNON, Ill., the county seat of Jefferson County, is a city in the south-central part of the state, seventy-six miles southeast of Saint Louis and 104 miles north and east of Cairo. It is on the Louisville & Nashville, the Southern, the Chicago & Eastern Illinois and the Wabash, Chester & Western railroads. The population in 1910 was 8,007; in 1916 it was 9,760 (Federal estimate). The area of the city is nearly three square miles.

Mount Vernon is the headquarters of the fourth appellate court district of the state, and

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has an attractive appellate court and state library building, a Federal building, a Carnegie Library, and Highland Park, a playground of forty-two acres. Car manufacturing is the principal industry; the annual output is valued at $3,000,000. Other manufactures are cut glass, mattresses and hosiery. Farming and coal mining are the occupations of the surrounding country.

The place was settled in 1819, incorporated as a town in 1837 and became a city in 1872. K.S.

MOUNT VERNON, N. Y., a residential suburb of New York City, adjoining it on the north. It is in Westchester County, in the extreme southeastern part of the state, and is on the Bronx and Hutchinson rivers. The Grand Central Station in New York City is thirteen miles south, and New Rochelle is four miles east. Transportation is provided by the New York, New Haven & Hartford, New York Central and New York, Westchester & Boston railways. Electric lines connect Mount Vernon with New Rochelle, Yonkers and other cities and villages. The first settlement was made in 1851, and the city was incorporated in 1892. According to the Federal census, the population increased from 30,919 in 1910 to 37,009 (estimate) in 1916; the state census of 1915 reported 37,583. The area exceeds four square miles.

Mount Vernon is a city of beautiful homes, well-kept lawns and gardens, and broad, shaded streets; the Bronx Valley Parkway passes through the city. From Chester Hill, in the northeastern part of the city, a fine view of Long Island Sound is afforded. The Carnegie Library, the Lucas Building, Mount Vernon Hospital, the State Armory, Proctor's $300,000 theater and a $300,000 high school are the noteworthy buildings of the city. Although Mount Vernon is primarily a residential city, it has about fifty manufactories. R.O.G.

MOUNT VERNON, Ohio, the county seat of Knox County, is a city north of the center of the state, forty-five miles northeast of Columbus. It is on the Kokosing River and on the Pennsylvania and the Baltimore & Ohio railroads. The area is nearly two square miles. In 1910 the population was 9,087; in 1916 it was 10,628 (Federal estimate).

The State Tuberculosis Sanitarium, constructed at a cost of over $1,000,000, is located a mile from the city, near Hiawatha Park. The principal industries include Corliss-engine, locomotive and bridge works, foundries, cooperage and bent-wood works and manufactories for making plate glass and wood-working products. The city is near natural gas and oil beds and the river furnishes water power. Mount Vernon was settled in 1805, incorporated as a town in 1845 and became a city in 1853.

MOURNING. This term, as ordinarily used, refers not so much to grief for the dead, or for some calamity, as to the external, more or less conventionalized symbols of such grief. Almost every nation has had its special mourning customs. That of the Jews is described in the following verse:

> Mordecai rent his clothes, and put on sackcloth with ashes, and went out into the midst of the city, and cried with a loud and bitter cry.

The Greeks shaved their heads in token of grief, while the Romans, on the other hand, allowed their hair and beards to grow, and neglected their clothing. In more recent times in most nations more restraint has been practiced, and the signs of grief have been limited, in the main, to the wearing of certain colors. The Western nations have without exception adopted black, certainly the most gloomy of colors, as the mourning shade, but in many of the eastern countries white, yellow or even red is worn in times of bereavement.

In America the custom of wearing mourning is much less common that it was even a few years ago. Putting off of the mourning "weeds" less than a year after the death of a close relative was formerly considered a token of disrespect to the dead, but to-day the bad psychological effect of the gloomy, monotonous mourning color is clearly recognized.

MOUSE, *mous,* a little, gnawing animal of the same family as the rat, from which it is distinguished only by its smaller size. It is known everywhere in the world except in a few islands of the Pacific Ocean. The house mouse, originally from Central Asia, has followed man to all corners of the globe, and is still a regular traveler on steamboats, railroads and pack trains. In its characteristics, color and size, unlike other animals, it is the same the world over. It does most of its work in the night, coming forth from its nest within the walls or ceilings, or in the dark corners of the attic or cellar, to sample the milk, cheese, bread or other food left uncovered. Its large eyes and ears and long whiskers are suited for midnight

COMMON MOUSE

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exploration, and to be "as quiet as a mouse" is to be noiseless. Like the squirrel, it holds its food in its front paws. Its long tail is believed to be useful in climbing and in jumping.

YOUNG MICE
Blind, pink and hairless.

Mouse color is so difficult to see that a somewhat similar gray is used for warships and for the uniforms of the German army.

The field mouse, meadow mouse and wood mouse live outdoors, or in barns or granaries. The hawks, owls and snakes are their enemies, and where these are exterminated the mice, multiplying rapidly, soon become a pest and destroy all the grain in the fields. The *jumping mouse* and some other outdoor animals called mice are of a different family (see JERBOA; VOLE; RAT).

How to Rid the House of Mice. It is practically impossible to have a mouseless house without a cat, even though the latter is not desirable. Covering the small holes in the floor and walls with metal may keep mice out of a new house, and traps may reduce the numbers in an old one, but their natural enemy, the cat, is their most serious foe. Poison is often left exposed on food for mice, but this method of extermination is not recommended; the animals die in the house in inaccessible spots, and there is always present the danger that little children may find the poisoned bits.

MOUTH, the cavity through which food is taken into the body, and which also has an important part in the formation of sound in talking and singing. The mouth opening is provided with a pair of lips which help us to drink and to pick up our food, and within the cavity are two sets of teeth, an upper and a lower, which serve to grind and crush the food into a pulp. In the walls of the mouth are located glands which secrete saliva. This fluid is mixed with our food as we chew it, and it helps in digestion. The top of the mouth, popularly known as its "roof," consists of a front bony portion called the *hard palate,* and, back of this, a soft part called the *soft palate.* The former serves as a partition between the mouth and the nose, and the latter, which arches down at the back of the mouth, forms a curtain between the mouth and the pharynx. The pharynx is a funnel-shaped sac which connects with the gullet, or food tube. Hanging down and slightly to the rear is a small cone-shaped prolongation of the soft palate, known as the *uvula.* The mouth cavity is lined with thin mucous membrane.

Extending from the floor of the mouth is a bundle of muscles, the *tongue,* one of the most useful organs in the entire body. It is flexible and movable, and during the process of eating it pushes the food between the teeth, moves it out of the sides of the cheeks, collects it into small masses and thrusts it into the food tube, through which it enters the stomach. Though the power of the voice is determined largely by the chest and lungs, the mouth, including the lips, has an important part in its musical quality and expression.

Care of the Mouth. Through the nose and mouth openings harmful germs find entrance into the body, and both of these cavities should be kept scrupulously clean that disease may be warded off. Because the mouth cavity is warm and moist all of the time it is an ideal breeding place for innumerable germs of every kind, and because it is lined with a thin membrane through which germs pass easily into the blood, an unclean mouth is a constant source of danger. Not only should the teeth be scrubbed thoroughly after each meal, but also the gums in which they are embedded. Diseased gums cause the loss of teeth from pyorrhoea and they also contribute to decay. The teeth should be brushed up and down (lengthwise) as well as crosswise, to remove every particle of food left in them. Daily washing of the mouth cavity with a mild antiseptic, such as diluted peroxide of hydrogen or other good tooth wash, is also advisable. W.A.E.

Related Subjects. The reader is referred to the following articles in these volumes:

Mastication	Teeth
Membranes	Voice

MOUTH ORGAN. See HARMONICA.

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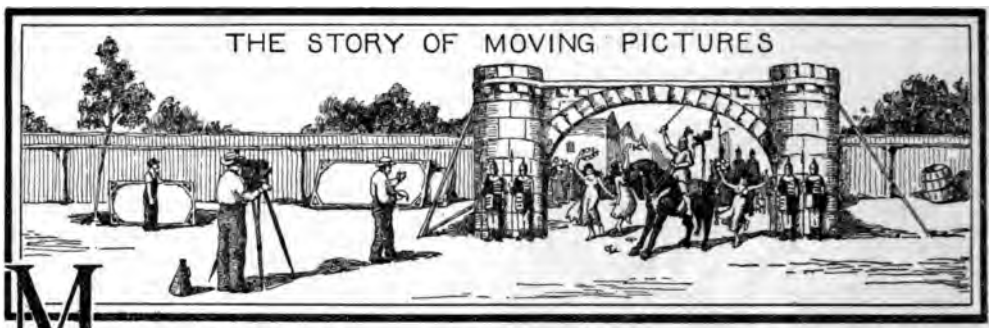

MOVING PICTURES. It is probably not an exaggeration to say that moving pictures are the most revolutionary invention since the printing press. Flying machines are more spectacular, the telegraph, the telephone and the sewing machine have a greater industrial value, but none of these can rank in educational importance with the moving picture camera. For, just as the printing press put books, once the exclusive possession of a privileged class, within the reach of every one, so have moving pictures put within the reach of every one a phase of knowledge that cannot be contained in books. There are ideas, of course, which cannot be communicated by means of pictures, but on the other hand there are things which can be communicated to large numbers of people in no other way.

Moving pictures can present to a child a vision of all the wonders of the universe in a language which he can understand, for they do not demand ability to grasp the contents of a printed page. They speak the simplest language known to man, a picture language. The cave men of France made drawings on the walls of their caves thousands of years ago, from which we of to-day can read their history. The Egyptians developed a picture language which speaks to us after the lapse of centuries. In moving pictures we have gone back, in a sense, to that most primitive means of communication and have translated it into a universal language. For pictures speak in every tongue; in them we have a language which enables people in any part of the world to tell their story to other human beings in every quarter of the globe.

New Worlds to Conquer. This does not mean that books have lost any of their value, but simply that books, indeed, life itself, can be made more interesting through the use of moving pictures. History and geography and natural history, science and industry, art and literature can be made more vivid and interesting by means of this invention. We study history to gain a knowledge of the world as it was before our time. This knowledge is locked up in books and historical documents, in the literature and art and architecture of the past. The moving picture producer can make use of every available historical source to reproduce a picture of a bygone age and bygone peoples. In one film he can present material that it would take one individual years to cover and which is not accessible to the average person in any form. *The Last Days of Pompeii* is a good example of such a film, and the effect of seeing this picture play is not only to gratify curiosity about a particular period, but also to stimulate it, so that one will want to know more and will go to books for this further knowledge of ancient peoples.

Filming Textbooks. Geography is the study of the surface of the earth as it exists to-day and of the plants and animals and human beings that live on that surface. The moving picture camera-man is bringing an intimate knowledge of this world to the smallest country town. There is scarcely a spot on the earth's surface which he may not visit, no jungle fastness nor barren Arctic wilderness which may not furnish materials for his camera. Much of the same material might be presented in still photographs, but until now such pictures have had so small a circulation that their production has not been commercially profitable. The moving picture theater has made them so. F. A. Talbot, an English writer, suggests that most of the so-called geographical films are merely "travel subjects" for the theater—an attempt to make a subject fit both the theater and the schoolroom. And this is doubtless true. Such films have, nevertheless, a very great value as a supplement to textbook explanation. But Mr. Talbot further insists that a whole textbook might be written in moving pictures which would present the subject far more graphically than could any book.

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He uses as an illustration a lesson about rivers. He suggests that the source of a river in a spring, in the outflow of a lake or in the melting ice of a glacier, may first be shown; next would come pictures illustrating its growth, the inflow of tributaries, then the many sudden changes through which it passes—its rapids and falls and shallows, and all the varying force of its current. The pupil can be introduced to the use made of this waterway, the craft on its upper reaches and the traffic in which they are engaged, the steam and motor navigation on the lower reaches, when the river has broadened out into a mighty stream, and towns and cities begin to appear on its banks. Such a film would be expensive to produce and would require infinite labor, but its great value for school purposes ought to justify such an expenditure.

Natural History. The greatest success achieved so far by moving pictures in the field of education has been in connection with natural history. Many wonderful films of plant and animal life have already been made. Every one can study the living things in his immediate environment, but he cannot see all that the camera can see. Pictures of the bottom of the ocean with its strange plants and animals, pictures of the haunts and habits of birds and reptiles and other animals, which it has taken weeks and months to complete, are brought to us by the patient camera-man. And, more than this, the camera pictures wonders which no human eye can see, photographs of plants and insects enlarged under a microscope. The activities of a bee colony have been recorded by the great Frenchman, Henri Fabre, in his *Life of the Bee;* J. C. B. Mason, an English photographer, whose specialty is the filming of insect life, has produced four films depicting almost as marvelously the activities of the honeybee.

A film company in London is making an attempt to secure from the most prominent European scientific photographers their entire output of educational, scientific and natural history subjects; it is endeavoring to persuade the eminent teachers of certain subjects to commit their work to celluloid film, and it is encouraging also the independent photographer by making the production of scientific films profitable to him. The Pathé Company in the United States has been collecting films of this kind for years and probably has the most remarkable library in the world. Practically every film which has a genuine scientific and educational value is included in this library, but the collection is not yet available for general use.

A film used by the Sheffield Scientific School at New Haven, Conn., called *The Story of Pig Iron,* is a good example of another sort of educational film. The story of sulphur or of common table salt, or of a hundred other mineral products, might be done in the same way. Indeed, there is scarcely a great industry that does not lend itself to this method of presentation. Lessons in public health and hygiene may also be given in this way. The "swat-the-fly" movement has been powerfully assisted by the exhibition of films showing flies at work in spreading disease. A vast amount of good has been done toward improving health and hygiene through moving pictures. Films have been made ranging all the way from a picture illustrating how to clean the teeth properly to a picture showing how to combat the spread of terrible infectious diseases. Clean milk and clean streets have been secured to many a community through the inspiration of moving pictures.

Scientific Investigations. But it is in connection with scientific investigation that the most wonderful films have been made, notably in France and in Germany. The Marey Institute in Paris, founded by Dr. E. J. Marey, an eminent French scientist and a pioneer in moving-picture work, has accomplished seeming miracles. The men engaged in the work use cameras which will take more than two thousand pictures a minute, and other cameras which take one picture an hour. With the very rapid cameras they have studied such movements as the flight of an insect, the beat of a bird's wing; with the slower cameras they have secured such a picture as the budding and blossoming of a flower. To take such a picture the camera is kept before the object sometimes for weeks.

The fastest camera in the world is the invention of Dr. Cranz of the Berlin Military Academy. This camera and the intricate apparatus which operates it have been devoted entirely to the study of the flight of projectiles. The pictures produced are of standard size but the images shown are in silhouette. Five hundred consecutive pictures can be taken in one-tenth of a second; the period of exposure is between one-millionth and one ten-millionth of a second. When the pictures secured are projected on the screen at the rate of about sixteen pictures a second (the standard rate of projection), the flight of a bullet can easily be fol-

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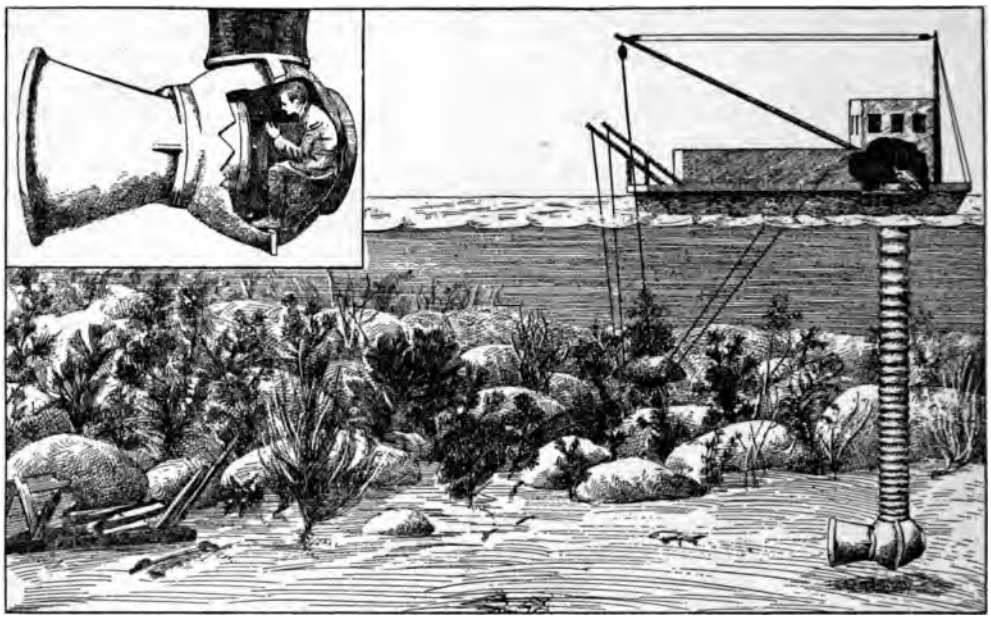

THE SEA BOTTOM IN MOVING PICTURES

The method employed in securing pictures of life near the coasts, where the water is about fifty feet deep. The operator sits in the space at the bottom of the collapsible tube which extends downward from the flat-bottomed vessel. An enlarged view of his workroom is shown in the corner picture.

lowed. One film shows the effect of a bullet striking a suspended rubber ball filled with water; another shows the effect of a high-velocity bullet striking a bone and shattering it.

Moving Pictures in Medicine and Surgery. During the last few years the use of moving pictures by physicians and surgeons has been greatly extended. By combining the microscope, the ultra-microscope and the "rapid-fire" camera, the most minute microbes have been studied. By combining the X-ray machine with the moving-picture camera equally striking results have been obtained. The processes of digestion in a frog, in a fowl, in a lizard and in a trout have been photographed; also the processes of the human body, showing the bending of the knee, the opening of the hand, and the like. In addition, great surgeons have been photographed performing some very delicate and difficult operations, such as bone grafting, and this film is available for other surgeons to study.

Industry and Moving Pictures. Frank B. Gilbreth, of New York, an authority on workshop organization, is perfecting scientific management through motion pictures. By means of an elaborate mechanism, Mr. Gilbreth is able to photograph all the motions made by a workman in doing a particular piece of work. These pictures are not made to be projected on a large screen, but are studied under a microscope with a view to discovering waste motions and later reducing all the workman's movements to a minimum. Some of these pictures were made by attaching an electric light bulb to the operator's head and hands and studying the photographed paths of light. Other pictures have been developed for the benefit of apprentices. An apprentice is shown, step by step, the movements made by the most skilled workman in the shop; experience has demonstrated that a youth can learn his craft more quickly by following it on the screen than by observing the actual work. This is due to the fact that many of the movements of a skilled workman cannot be followed with the naked eye. Once these movements have been photographed, however, the camera projects them at a rate slow enough to be studied.

Moving Picture Targets. Another interesting use that has been made of moving pictures has been in improving marksmanship. The motion picture had scarcely been perfected when the war departments of the various countries were flooded with suggestions for making this use of them, but the animated target has not yet been extensively used by military authorities. The idea is as follows: Instead of using the

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ordinary target for practice work the soldier fires at a moving-picture target, representing, for instance, a man behind cover, aiming directly out of the picture at the real marksman. Finally, in making his shot, the man in the picture exposes himself, and that is the instant when the marksman must shoot. The picture is so managed that it stops automatically when the bullet hits it so that the marksman may have a chance to see whether or not he has made an accurate shot. Pictures for this work are usually projected at a little less than ordinary speed, as a rate of sixteen pictures a second has proved too rapid even for the exceptional marksman. Pictures of hydroplanes, aeroplanes, birds in flight and wild animals, all furnish suitable subjects for these moving targets.

The Moving Picture Industry

Moving picture production has gone ahead in two fields. There have been the scientists, Europeans for the most part, who have disregarded the commercial possibilities of the new invention and have bent all their energies to research and investigation, and there have been the men, Americans for the most part, who have used it to build up a vast amusement industry. This industry sprang up almost over night, a mushroom growth that had achieved immense proportions almost before people were aware. It was in 1897 that Cecil M. Hepworth wrote: "That the kinematograph has contributed much to the gayety of nations can hardly be denied, but that it will continue to do so to anything like the same extent for much longer is highly improbable." Hepworth did not know, of course, nor did anyone else, that the time would come when more than 5,000,000 people would visit moving picture theaters every week; that the total investment in the United States would be estimated at more than $400,000,000, and that this amusement enterprise would give employment to more than half a million people—and yet these are considered conservative estimates to-day.

America leads the world in the production of photoplays. Some wonderful films have been imported from Europe, stupendous productions like *Cabiria* (which was made in Italy), but the importation of films has never equaled the exportation, which amounts to approximately $5,000,000 worth every year. In the beginning the plays produced were, for the most part, very crude—the results of the experiments made by a few expert photographers who had perfected cameras and projecting machines and were determined to use them. But the photoplays of recent years at least equal in dramatic excellence anything produced on the legitimate stage. *Quo Vadis, Les Miserables, Cabiria, Last Days of Pompeii, Don Quixote, The Prince and the Pauper, Birth of a Nation, The Battle Cry of Peace, Civilization; Camille* and *Queen Elizabeth,* with Sarah Bernhardt; *Carmen,* with Geraldine Farrar; *Tess of the D'Urbervilles,* with Mrs. Fiske; and *Madame Butterfly,* with Mary Pickford, are among the most notable of motion picture productions. Many of these films require hundreds of scenes and hundreds of actors; they represent months of labor and an expenditure of money which is almost unbelievable; and they also represent the genius of the greatest actors and producers the world has ever known. But, in spite of the success with which these productions have met, the bulk of photoplays are still quite mediocre—farce and melodrama.

Where the Pictures Are Produced. Production, at first, was decidedly haphazard. The studios where the pictures were taken were for the most part old buildings where rents were cheap, the stage properties were makeshifts, the whole equipment utterly inadequate. Artificial lighting had not been attempted. The first Edison studio was a little house on wheels that was made to revolve on its base so that any face could be turned towards the sun. Nowadays, while it is useless to take pictures out-of-doors unless the day is bright, lights have been invented which make it a simple matter to take pictures in the studios at any time. Mercury vapor lamps and, recently, gas-filled tungsten lights will make any stage lighter than day. Portable mercury vapor lamps have made it possible to take pictures in factories and stores and restaurants. Scenes have even been taken in coal mines, hundreds of feet beneath the surface of the earth, and the great tunnels under the Hudson River, New York, have been filmed.

Picture-Producing Plants. Florida and Arizona, New York and Pennsylvania, New Jersey and Illinois, all have important picture-producing plants, but the great moving-picture center is California. This is due to the fact that the climate of California, with its almost continuous sunshine, makes it possible to take

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pictures practically every day in the year. Around Los Angeles the studios cluster by the dozen. But it is absurd to refer to these plants as *studios,* for they are actually manufacturing plants, a little more picturesque than the ordinary factory. Universal City is the largest of the big plants, and as it is also a model plant, embodying all the newest features of picture production, it deserves a detailed description.

Universal City. Universal City, so-called, is the largest picture-producing plant in the world. It is an actual city, with a population of more than 1,500 people, with broad, paved streets, with a main boulevard six miles long, with its own gas and electric light plants, with a mayor and police and fire departments, with two hospitals and a restaurant, with offices and studios. There is even a race track with a huge grand stand that will accommodate thousands of people. When a great scene is being filmed, such as the bullfight in *Carmen,* these seats are sold to the thousands of interested people who come out from the near-by cities, and the director is spared the necessity of hiring a crowd of "extras," as they are called, to fill the seats.

Everything in Universal City has a double usefulness. A building may house the scenario department within, while without it is designed to furnish a background for pictures. The buildings are all built with a different façade on each side, so they may figure in not one, but four, different scenes. As for equipment, there are horses by the dozen, Arabian mares and Shetland ponies, mustangs and mules and burros; there are forty different kinds of horse-drawn vehicles and as many motor cars; there is a tribe of Indians, one of the largest in the United States; and there is a great "zoo," one of the greatest in the world. In addition there are shops where practically everything needed in the production is made; carpenter shops, machine shops and dressmaking shops—factories for turning out everything demanded by the exacting director.

The Scenario Department. The scenario editors for some of the large companies actually write all the plays produced by those companies and receive large salaries for the work. But it is more usual for the scenario editor simply to put into shape all the ideas which are supplied from a dozen sources. If a great novel is to be produced the scenario editor turns it into a play. Stories are bought from magazines and shaped into plays. Ideas submitted by amateurs are often bought and made into plays. And the scenario department also puts into acting form any ideas furnished by producers and directors. When a scenario is complete it is turned over to the director who is to produce this particular play.

The Director. Only one copy of the scenario, which is really the text of the play, is needed, and that is in the hands of the director. When he receives a scenario he sets about ordering the properties, stage settings and costumes which will be needed. To each of the principal actors, if it is a modern play, he furnishes a "dress plot," a list of the number of scenes for which they will need changes of costumes. If it is a "period" play, that is, a play representing a bygone day, the director furnishes all the costumes. When all the preparations have been made, the play begins.

Acting a Moving Picture Play. The director posts on a bulletin board a list of the actors who will be needed for a particular scene, and the actors, who are generally expected to arrive at nine o'clock in the morning, go at once to this board to get their orders for the day. When all are assembled the director rehearses them in the scenes until they are perfect; then the camera-man begins his work and the picture is taken. None of the actors, as a rule, knows what the play is about, for the scenes are seldom taken in consecutive order; it would be too wasteful a method. Once the stage is set, all the scenes which take place in the setting are acted and photographed, one after another, regardless of the order in which they occur in the finished production.

Practically all of the "stars" of the legitimate stage have now appeared in moving pictures. Sarah Bernhardt was the first to do so. She explained that she, for one, would not dream of disregarding this means of immortalizing her art. And, in addition to the stars of the legitimate stage, there has been developed a school of actors—men and women trained in the technique of pantomimic acting, who are, perhaps, even greater favorites with the public.

The Development of Moving Picture Art

What was the origin of this vast amusement enterprise? It was nothing more nor less than a child's toy, based on an optical illusion. When the eye sees a moving object, the image of the object is retained for about one-sixteenth of a second, even though the object itself may

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have been visible only one-tenth of that time. This fact is known as *persistence of vision,* and it is the principle on which moving pictures are based. Although pictures are said to be in motion on the screen, as a matter of fact there is no motion at all. The eye imagines it sees movement. But what it actually sees is a series of pictures which are stationary on the screen for an instant and whose movement out of sight is concealed from the eye by a swiftly-moving shutter which cuts off all light from the screen for a brief instant. The eye, being more susceptible to light than to darkness, records only the pictures and not the interval when the screen is black, and an effect of motion is thus produced.

The fact of persistence of vision was first noted by Lucretius, a Roman writer, in the year 65 B.C. Ptolemy, a Greek philosopher, noted the same principle about two hundred years later, and proved it by means of a revolving card on which a series of dots took the appearance of a continuous line. Every child who has whirled a burning stick to produce a ring of fire has had proof of the same principle.

No use was made of this principle until 1825, when a child's toy was invented which consisted of an oblong card with pictures on both sides, which was turned by means of a string so that the two pictures gave the appearance of one. More elaborate toys were later invented, one known as the *phenakistoscope,* another as a *zoetrope,* which utilized the same principle. In 1884 a contrivance called a *choreutoscope* was invented for use in a stereopticon lantern. It was a plate painted with figures which moved in a sliding frame so that a series of images which appeared to be in motion were cast on the screen. This was, in fact, an actual moving picture.

The Earliest Photographic Moving Pictures. In 1872 Eadweard Muybridge, an Englishman, secured a number of photographs of the consecutive movements of a trotting horse by setting up a series of cameras along a race track, which were operated by a string broken by the passage of the horse along the track. These pictures were made in California and were first exhibited in America in 1879. In 1882 they were shown at the Royal Institution in London. Muybridge's method of obtaining these pictures was very clumsy and was quickly supplanted by other inventions. E. J. Marey, in Paris, had begun experimenting with the photographs of animals in motion, and in 1876 he perfected a camera which was known as the Marey photographic gun, which took a dozen pictures of an object in rapid succession. By 1889 celluloid film had been invented. W. Friese Greene and M. Evans in the same year filed for patent several specifications for a camera which utilized this film and which was capable of taking three hundred exposures at the rate of about ten a second. As soon as the Friese Greene camera had appeared, inventors in France, Germany, England and America were simultaneously working at the problem of perfecting similar cameras and projecting machines.

In America Edison was first with his *kinetoscope,* which was patented in 1893. In the same year he gave his first exhibit at the Brooklyn Institute. The pictures projected by this kinetoscope were viewed by one person at a time, looking through an eye aperture. In France, G. Demeney perfected a machine which he called the *chrono-photographe,* which he patented both in France and in England, in 1893. The *biograph* was the name given to a machine invented by Herman Casler of Canastota, N. Y., a projector which used larger pictures than the size standardized by Edison. From this time on the work of perfecting the mechanical devices for taking pictures and projecting them was carried on with the spectacular results that have already been noted.

The Camera. The typical moving picture camera is rectangular in shape. An average size is twenty-four by fourteen by five inches. There are larger cameras than this, of course, and others which are much smaller. The Williamson camera, for instance, is nine and one-half inches square by four and three-fourths inches deep, and weighs only seven and one-half pounds, including the reel of film. The camera case is usually made of polished wood, very strongly put together, with a handle for carrying. Although there are dozens of different makes of cameras on the market, ranging all the way from $60 to $1,000 in price, they all operate on the same principle.

The essential feature of a camera is that it shall take a series of snapshots in rapid succession, with an exposure brief enough to record no movement blur, on a continuous length of film. This film must be made to move before the lens of the camera in a regular series of jerks; at the exact instant when the shutter of the camera opens and closes, this film must be absolutely at rest and then it must move abruptly onward to bring into position the next space which is to be exposed.

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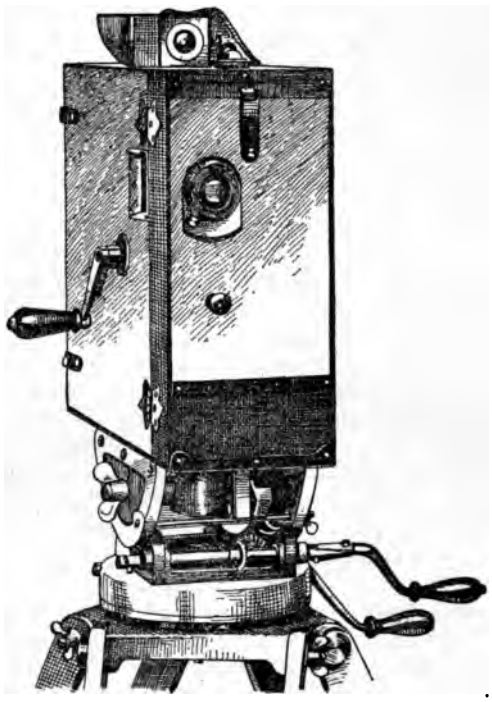
If viewed from the side, the interior of the camera is seen to be divided into two sections by a long, narrow tube which runs through the middle and contains at one end the lens, at the other end an aperture with a screw cover which serves as the "finder" for the machine. Often there is an additional finder on top of the camera. The back half, upper and lower, is occupied by two zinc boxes containing the spools of film, the upper for unexposed, the



THE CAMERA

The most modern device of the kind, with patents granted in 1917.

lower for the exposed, film. The unexposed film is wound on a spool, and the end runs off this spool and under a guide roller, then under a wheel which is furnished with sprockets which catch the perforations in the edges of the film, to keep it from slipping. Usually there is a spring roller as well, which presses the film firmly against the sprocket wheel and makes slipping impossible. The film then passes through a gate which is just behind the lens. The gate holds the film perfectly flat and steady during an exposure. Below the gate is the mechanism which, by means of claws engaging the perforations in the film, jerks it down space by space, as fast as it is supplied by the sprocket wheel. Below this mechanism the film passes under another sprocket wheel, then under another guide roller, and finally winds upon a second spool.

The Shutter. The shutter of a motion picture camera is circular, with a triangular opening in it. Because the shutter is geared to the same crank shaft as that which feeds the film, its proportionate rate of speed cannot be increased. It makes one revolution every time a space of film is exposed. But, since the length of time for an exposure varies with the amount of sunlight, it is essential that the shutter be adjustable. To secure this, it is made in two pieces. If a very brief exposure is needed, the aperture in the shutter is made smaller; if a long exposure is needed, it is made larger. The mechanism which jerks the film into place is also geared to the same crank shaft. This makes the camera very easy to operate. The photographer simply turns the crank handle on the outside of the camera, making usually two turns of the crank in taking sixteen pictures, and the film begins to move, the claws jerk it into place, and the shutter revolves.

Other Fittings. Most cameras are fitted with a measurer, which registers on a dial on the outside of the camera the number of feet of film exposed. There is a device for punching a hole in the film to mark the end of an exposure —to show where one subject finishes and another begins; and there is a speed indicator which shows exactly how fast the handle is being turned.

The Tripod. The tripod used is geared so that it may be adjusted to any level by the turn of a crank; the table of the tripod also revolves so that the camera may be turned in any direction, and it also tilts at will. The tripod is very strongly built, for absolute rigidity is necessary in taking good pictures.

The Film. All motion picture cameras and all projecting machines use one size of film and take pictures of one size only. All film is one and three-eighths inches wide, including the perforations, and the length of film exposed for each picture is three-quarters of an inch. One foot of film, therefore, contains exactly sixteen pictures. The film may be bought in any length, from 100 to 5,000 feet, but the average camera will contain only 2,000 feet of film at one time. Practically all the film on the market is supplied by a Rochester, N. Y., firm.

Developing the Film. All cameras containing exposed film are taken to the developing plant of a studio and unloaded in a dark room. Here the film is unwound upon a revolving upright frame, and it stays on this frame while it is de-

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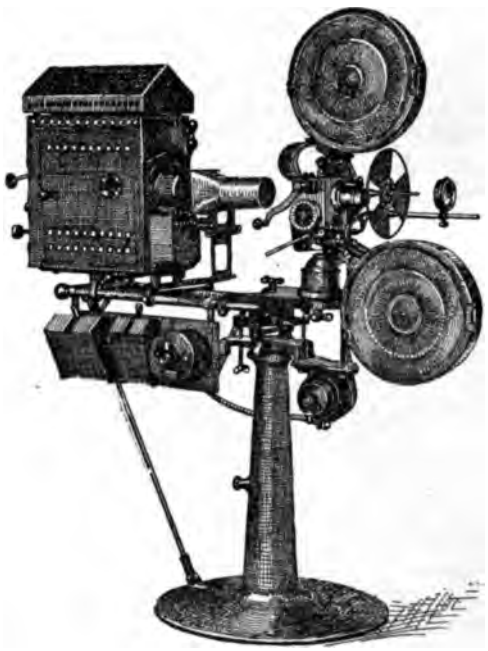
veloped, rinsed, "fixed," and rinsed again. For drying it is wound on a great cylindrical frame and fanned. This drying process is a very delicate one. The drying cannot be done with warm air because heat melts the emulsion with which the film is coated. The room in which the drying is done has to be absolutely dust-proof because the tiniest particles of dust would spot, and thus spoil, the film.

The developed film is known as the *negative*. The films which go out to the picture theaters are known as *positives*. Positive films are not made until the negative has been inspected and the entire picture "assembled." For, as it has been noted above, scenes are not taken in their consecutive order, and a negative is, therefore, usually an unassorted group of dozens of scenes. But each of these scenes is numbered, at the time the picture is taken, in a very simple way. Someone in the picture simply holds up a card on which the number of the scene is printed and this appears in the photograph. The camera-man, too, has marked the end of all scenes by punching a hole in the film.

The negative, when developed, is cut in two wherever these holes have been punched. The sections of film are dropped into cylindrical containers and sent to another workroom. Here operators sort the lengths of film according to number, and glue them together. This negative is then inspected by the director, who cuts out any imperfect portions and indicates where the printed explanatory matter is to be inserted. These captions are printed in silver on black cards, photographed separately, and inserted in the finished negative. It is from this negative that the positive prints are taken. The positive prints are made by means of very elaborate and efficient machines operated by electricity. Because of the enormous number of positive prints which have to be made, the printing room is one of the largest in the developing plant.

Distributing the Finished Film. Practically all the film produced is handled by the film "exchanges" located in all the large cities. It comes to them from the producing plants, each film in a round zinc box, securely protected from dust and fire. The exchanges do not sell a film to a theater, but simply rent it, and eventually it all returns to the producing plant, where, if it is worth saving, it is stored in a great fireproof vault. A large film exchange, which keeps thousands of films moving all the time, is an exceedingly busy place. Usually a film is out of the exchange for only three or four days. As soon as it comes in again it is inspected for broken places and for spots and dirt. Torn places are cut out and the film glued together again, and, if it is very dirty, it is washed in the film laundry which all large exchanges maintain. If it is badly spotted it is retouched by hand and then is ready to go out again. In the hands of careful operators one film can usually be run five hundred times, but the life of many films is much shorter than this.

The Projecting Machine. A moving picture projector is nothing more nor less than a stereopticon lantern in combination with a mechanism for moving the film in front of the lens of that lantern. The film must move at such a rate of speed that sixteen pictures are projected in one second. But this motion cannot be smoothly continuous. The motion of the film must be intermittent; it must move ahead and then come to rest at the exact instant when the revolving shutter exposes it to the beam of light from the lantern; and then, when the shutter cuts off the light, it must move ahead again. The mechanism for moving the film is almost exactly like that in the camera. The



THE PROJECTING MACHINE
An instrument like the one shown above flashes upon the screen the pictures you may enjoy every evening, provided your favorite theater has the latest machine, with 1917 patents.

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lantern used is a carbon arc light which gives a very intense flame. This flame is further intensified by being focused to a pin point by means of two lenses, so that a very clear, sharp image will be cast on the screen. If, for any reason, the film stops moving this light would set it afire. To avoid this danger all projecting machines now have a metal gate between the light and the film which closes automatically whenever the film stops, cutting off the light. In addition, the operator and machine are placed in a metal fireproof booth, so the audience will not be imperiled in case of fire.

Fireproof film was being generally adopted to avoid all danger from fire, but it was a European invention and the War of the Nations cut off the entire supply. Experimenting is now being done in a number of laboratories in an attempt to discover the formula for this film, but up to 1917 no one had succeeded. All projecting machines in theaters are operated by electricity. There are a number of smaller, hand-power machines on the market, but their use is greatly restricted because it is impossible to generate a powerful light in such a machine. Some use of these hand-power machines has been made in schools, but the pictures thrown on the screen are not clear.

The Censorship. Moving pictures differ from any other form of amusement in that they are presented to audiences composed of people of all classes and all ages. Because children began attending these theaters in such large numbers, the question immediately arose as to whether or not the sort of pictures presented were an influence for good. The People's Institute of New York reached the decision that much was being presented in pictures which was directly harmful to the public. It was with the children in mind that the National Board of Censorship was founded in 1909. This is a voluntary and unofficial group composed of intelligent, highly-educated men and women of unimpeachable moral character, none of whom is engaged in or has any connection with the moving picture business. This board views about ninety-five per cent of all the films produced in the United States and suggests any changes that they deem advisable. The work of the board is supplemented by local boards in most of the large cities. Every film which is exhibited in any large city, even though it has been passed on by the National Board, is viewed again by a local board or a state board, before it can be exhibited. There has been much dissatisfaction with moving-picture censorship.

Some of the best books on the subject of moving pictures are *The Cinematograph Book*, a *Complete Practical Guide to the Taking and Projecting of Cinematograph Pictures*, edited by Bernard E. Jones; *Practical Cinematography and its Applications*, by Frederick A. Talbot; *The Handbook of Kinematography*, by Colin N. Bennet; *The Theater of Science*, by Robert Grau; *Making the Movies*, by Ernest A. Dench; and *The Art of Moving Pictures*, one of the best books for general reading, by Vachel Lindsay. Perhaps the most interesting material, however, will be found in the files of the popular magazines, especially the moving-picture publications.

MOWAT, *mo'at,* Sir Oliver (1820-1903), a Canadian statesman and jurist, who enjoyed the distinction of acting as premier of Ontario for twenty-four consecutive years, a longer period than any other premier, in the history of Canada or the British Empire, has ever held office. Mowat became premier in 1872, and retained the office until 1896. His administration was chiefly noteworthy for frequent disagreements between the provincial and Dominion governments, in practically all of which the Ontario government was sustained when the questions were carried to the courts.

Sir Oliver was born at Kingston, Ont., where he received his education and studied law in the office of Sir John A. Macdonald. In 1841 he was called to the bar, and for a number of years practiced his profession at Kingston. Elected to the Canadian assembly in 1857, he immediately took a prominent place because of his high standing at the bar. In 1858 he joined the Brown-Dorion Cabinet as provincial secretary, and in 1863-1864 was Postmaster-General in the Macdonald-Dorion Cabinet. The movement for Confederation had in him one of [illegible] strongest supporters, but in 1864, when it [illegible] just getting under way, he retired tempo[illegible] from political life. For eight years, 186[illegible] he was a judge of the court of chan[illegible] Ontario.

This service on the bench did n[illegible] his reëntrance into politics in 187[illegible] succeeded Edward Blake as lead[illegible] eral party and premier of Ontar[illegible] premiership many important [illegible] ing the relation of the provin[illegible] ion were settled, and many [illegible] tirely through his own al[illegible] When the Liberals were [illegible] 1896, Mowat was summ[illegible] Senate and was given [illegible] Justice in the Laurier [illegible] in the next year, and [illegible] was lieutenant-gov[illegible]

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MOWING, *mo'ing,* **MACHINE,** a machine for cutting grass. Its essential part is a frame carrying a long steel blade with sharp, triangular teeth along one edge, which moves rapidly back and forth in a metal guard. The grass is swept against the guard as the machine moves forward, and the keen knives sever the stalks close to the ground. The horizontal guard, or arm, is usually about four feet long, and it cuts a swath equal to its length. A good machine will cut from seven to ten acres of grass in a day. Two horses can pull it and furnish all the power that is needed to operate the knives. The wheels on which it rests are so attached to the blade that their circular motion is transformed into a rapid back-and-forth, or reciprocating, motion. The mowing machine is a simpler kind of reaping machine. Up to 1917 no mowing machines had been manufactured to be run by tractor, or gasoline, power. See REAPING MACHINE.

MOZAMBIQUE, *mo zam beek',* **CHANNEL,** the passage between the east coast of Africa and the island of Madagascar, bordering the province of Mozambique in Portuguese East Africa. The channel is over 1,000 miles in length and varies in width from 250 miles at the center to 600 miles at either end. A warm current passes through it, which, striking Agulhas Bank to the south, produces one of the roughest seas in the world. In the northern part of the channel, midway between Africa and Madagascar, are the Comoro Islands. On the west shore are the ports of Beira and Mozambique. Several submarine cables are laid in the channel from Mozambique and Beira to other East African ports and Madagascar. For illustration, see colored map AFRICA, or MADAGASCAR.

MOZART, *mo'zahrt* (in German, *mo'tsahrt*), JOHANN CHRYSOSTOMUS WOLFGANG AMADEUS (1756-1791), a German musician, born at Salzburg. At the age of two he showed such interest in the music lessons which his father was giving the daughter Nannerl that the ambitious parent began to teach him also, and at the age of three he was receiving a daily lesson an hour long. At five years of age he was composing short pieces for the harpsichord, and at six played before the Elector of Munich and the Empress Maria Theresa of Austria, at Vienna.

When the boy was seven years old he played before royalty at Versailles and Paris, and at the former city had the pleasure of seeing four of his compositions published. Then he and his father went to England and played before Queen Charlotte. There Johann composed his first symphony and astounded the Royal Society by his knowledge of music. "The professors of Europe stood aghast at one who improvised fugues on a given theme and then took a ride-a-cock horse on his father's stick." By this time the imperious Archbishop of Salzburg, by whom the father was employed as choirmaster, demanded their return, and, hoping to prove the lad a fraud, locked him in a room for a week to write an oratorio by himself. Johann did it, and the oratorio was sung in the archbishop's church a few weeks later.

MOZART

In 1769 the boy went to Italy to learn something of the music of that country, and while there played before astonished audiences in Milan, Bologna, Verona, Naples and Rome, and received from the Pope the title of Cavaliere and the badge of the Order of the Golden Spur, honors bestowed upon only the very greatest. There in Rome, also, he performed the wonderful feat of writing from memory the long papal *Miserere,* copies of which were never allowed to be taken by the singers from the Pope's chapel. Then at Milan the fourteen-year-old boy wrote an opera, *Mitridate,* which was sung twenty nights in succession. In 1775 he wrote an opera for the Munich carnival, and every song in it was greeted with "a tremendous uproar and clapping of hands."

At twenty-two he went to Mannheim, Germany, and began to teach and compose for his living, and there it was that the tragedy of his life began. He boarded with a family named Weber, and fell madly in love with Aloysia Weber, who was training to be an opera singer. He was soon called to Paris, where, with his mother as a companion, he worked earnestly. Suddenly the mother died, and Mozart journeyed back to the Webers for consolation, only to find that Aloysia's head had been turned by a little success in singing and that she would have nothing to do with him. He returned in sorrow to his home in Salzburg, where he

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wrote a number of masses and two operas, *King Thomos* and *Zaïde*.

At twenty-six years of age he was in Vienna, where he again met the Webers, fell in love with Constanza Weber, and over the protest of his father married her in August, 1782. Then followed nine years of desperate work, teaching, giving concerts and composing with a rapidity almost incredible, while a sickly, self-centered and selfish wife daily plunged him more deeply into debt. Constanza probably loved him, but she was weak-willed, and measured his success simply by the money he made. Amidst such trials he wrote his greatest operas, *Figaro, Don Giovanni* and *The Magic Flute,* masterpieces that will probably never lose their popularity. In the summer of 1788 he composed his famous symphonies in C major, G minor and E flat, frequently called "the most impassioned works in instrumental music," and with these came a host of shorter compositions. His efforts to pay his debts by frequent concert tours exhausted his strength, and in his thirty-fifth year the idea of death began to haunt him.

One day in the last year of his life a tall, gray stranger appeared before him and offered him a cash sum for a requiem, or death composition. The music was desired by an Austrian nobleman, but the stranger would give no further information. Mozart, in need of money, undertook the work, but as his weakness increased, he became possessed of the idea that this beautiful composition, *The Requiem,* was really for his own funeral, and day and night he stole time to work upon it. Upon his return from one of his concert tours in the fall of 1791, his wife was shocked at his pallor and weakness, and for once forgot about her own petty ailments. But help was too late; his weakness increased until Sunday, December 5, 1791, when, trying to explain exactly how *The Requiem* should be played, he sank back upon his pillow in death.

He was so poor that his funeral had to be exceedingly plain, and as the day was stormy no friends went to the grave in the common burial ground for the poor. A servant suggested placing a wooden cross on the spot, but his wife said that doubtless the parish officers would attend to it. So long a period passed before she revisited the grave that the sexton had removed the bones for those of another pauper. To-day a beautiful monument for him stands over the empty grave in Vienna, while no one knows where Mozart's dust lies. R.D.M.

Consult Gehring's *Mozart;* Holmes' *Life of Mozart.*

MUCILAGE, *mu'si layj,* a solution of the gum of a small tree growing in Arabia and other parts of Asia, from which gum arabic (which see) is obtained. This gum exudes from the bark of the tree after an incision is made, and soon hardens on exposure to sunlight and air. Gum of the best quality is semitransparent and readily dissolves in hot water, forming a mucilage whose thickness depends upon the quantity dissolved. The name is also applied to paste solutions such as are used on envelopes and labels and for a variety of other purposes, a few drops of carbolic acid being generally added to keep them from molding. Mucilage has its place in medicine, being valuable in all irritations of the mucous surfaces (see MUCUS, below).

MUCUS, *mu'kus,* a clear, sticky fluid which forms a layer of varying thickness on the surface of those membranes which line the cavities communicating with the outside of the body, such as the nose and mouth cavities and the intestinal canal (see MEMBRANES, subhead *Mucous Membranes*). Mucus is produced by certain cells in the mucous membranes, and its chief purpose is to keep those membranes moist and slippery and to protect them from irritating substances. The gullet well illustrates its lubricating action; the secretion of mucus in that tube enables the masticated food to slip down easily into the stomach. Minute particles of dust or lint breathed into the nose are washed down into the throat by the mucus and so are kept from passing to the lungs. When too much dust, or particles of it containing disease germs, are breathed into the nose the mucus becomes thick and yellowish and is secreted in larger quantities. This is due to infection of the membrane, and the condition is known as a "cold." See COLD. W.A.E.

MUD HEN. See COOT.

MUD PUPPY, WATER DOG, or MUD EEL, a long, slender salamander that lives in ponds and streams of America. It differs from nearly all the other salamanders in having gills which develop in the larval stage and are retained throughout the adult period. It grows to be about a foot long, in color a slimy, dirty brown, resembling a tadpole just before it loses its tail; it has a body like an eel's, with two short legs up under the head. There are four toes on each foot. In the daytime the mud puppy stays among the weeds and rocks in the mud, but at night it moves quickly

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about hunting for the crayfish, bugs and worms on which it feeds. See SALAMANDER; AMPHIBIANS.

MUD TURTLE, the name given to a dull-shelled turtle, usually less than five inches in length, which is found living in mud or muddy water, in all parts of the United States and Canada. See TURTLE.

MUEZZIN, *mu ez'in.* See subhead, in article MINARET.

MUIR, JOHN (1838-1914), an American naturalist who loved and studied nature, living most of his life out-of-doors. He loved to tramp and study all day long, and sleep, when night fell, on beds of moss and leaves or boughs. His equipment on these journeys consisted of a little bag of bread and tea and a few simple tools. He never killed game, for he looked upon wild animals as his friends.

John Muir was born in Dunbar, Scotland, and emigrated to America when a lad of eleven. His parents moved to a farm in Wisconsin, and as a boy he had to work very hard; but by rising frequently at one o'clock in the morning, he found time to read and study. Moreover, he invented a wooden clock that told not only the time of day but the day of the week and the month of the year. Out of the iron end-rod of an old wagon he made a thermometer, the expanding and contracting iron moving a finger to the degrees on a dial. Two inventions must have been suggested by the character of his daily life—an automatic device for feeding horses, and what he called a bathing machine. He also invented a barometer, a pyrometer and a hydrometer.

Some friends who were interested persuaded him to take some of these inventions to a fair in Madison, and the final result of this was that he entered the university there. After four years of study he began his long and interesting travels. He tramped through the country about the Great Lakes, then through Florida and Cuba, going afterwards to California. There in the land he called "the grand side of the mountains" he cultivated a large ranch and made his home with his family. He explored the Sierra Mountains and told the world about them in magazine articles. He traveled in Alaska and there discovered the great river of ice since known as the Muir Glacier. He also traveled in Norway, Sweden and Switzerland, and once made a trip around the world, visiting Russia, Siberia, Manchuria, India, Australia and New Zealand. One of his most intimate friends was that kindred spirit, John Burroughs (which see), America's great literary naturalist.

It is partly through the influence of John Muir that the United States government has carried on the great work of creating National Parks (see CONSERVATION). During the last year of his life he wrote of his travels and the nature secrets which he knew. Some of his most important books are *Our National Parks, The Mountains of California, My First Summer in the Sierra* and *The Yosemite.*

MUIR GLACIER, *gla'sher,* a celebrated glacier of Alaska, discovered by John Muir, for whom it was named. It is at the head of Glacier Bay, rises over 200 feet above the water, extends inland fifteen miles and covers an area

MUIR GLACIER

of 350 square miles. The extent below the surface of the sea is estimated at 700 feet. Muir Glacier is one of the great attractions to tourists visiting Alaska, since steamers can approach within a short distance of the shore. Its front is an overhanging cliff which resembles bluish-white rock, worn and rugged; from this front icebergs are constantly breaking with a loud crash and falling into the sea. See GLACIER.

MUKDEN, or **MOUKDEN,** *mook'den,* the capital of Manchuria, China, and of Shengking, one of its three provinces, about which was fought, in February-March, 1905, one of the greatest conflicts of modern history (see RUSSO-JAPANESE WAR). Mukden is situated in a fertile region about 400 miles northeast of Peking and 110 miles northeast of New-chang, its Liao River port, and is not far from the stream Hun-ho. The old Chinese name was Sin-yang, but the Manchus renamed it Mukden, which means *flourishing capital.* It is surrounded by a wall forty feet high, and is a well-ordered city, laid out on a plan similar to American towns.

Owing to the improved railway facilities and the development of the Soya bean, millet and rice industries, Manchuria has grown in wealth more rapidly than any other part of China. In 1905 China granted Japan the right to extend

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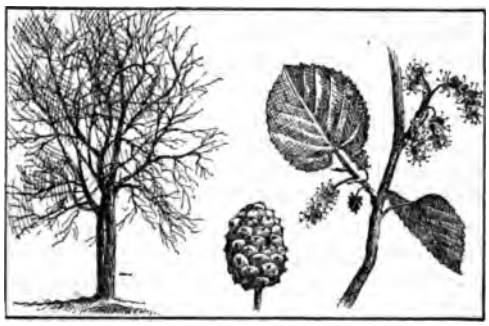
its railway from Mukden to Antung, where it connects with the Korean railway. In 1912 a railroad line was opened to traffic from Changchun to Kirin, and from Mukden southwards the railway extends to Dalny and Port Arthur. During the Boxer uprising in 1900 the city suffered greatly (see CHINA, subtitle *History of China*). Population, about 158,000.

MULATTO, *mu lat'o,* a person belonging to one of the mixed races, having white and negro blood in nearly equal proportions. The mulatto has tightly-curled hair and a yellow complexion, but resembles the white race more than the black. The child of a white person and a mulatto, being three-fourths white, is termed a *quadroon.* The term *mulatto* is often confused with the name *creole;* the latter is properly applied to a white person born in the Southern states of the Union, especially Louisiana, of French, Spanish or Portuguese ancestors. In a country where there are many mixed races the term *creole* is one of honor and confers social standing. See CREOLE.

MULBERRY, *mul'ber i,* a group of trees and shrubs belonging to the mulberry family, found in the temperate zones and in mountainous re-



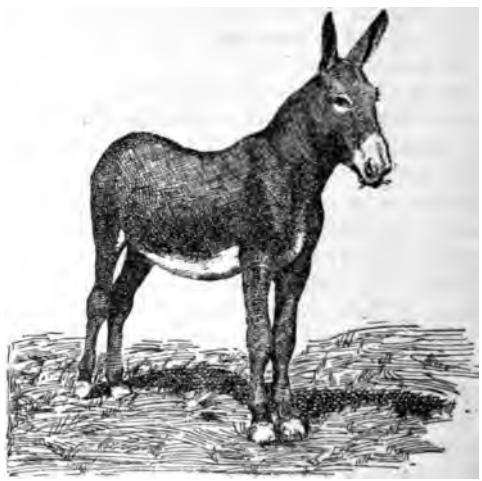
O, the mulberry-tree is of trees the queen!
Bare long after the rest are green;
But as time steals onwards, while none perceives
Slowly she clothes herself with leaves—
Hides her fruit under them, hard to find.
* * * * * * *
But by and by, when the flowers grow few
And the fruits are dwindling and small to view—
Out she comes in her matron grace
With the purple myriads of her race;
Full of plenty from root to crown,
Showering plenty her feet adown.
—MULOCK: *The Mulberry Tree.*

gions of the tropics. Of the several species, the *white mulberry* is of special economic importance, because its leaves form the best-known food for silkworms (see SILK). The white mulberry, which has been cultivated from earliest times in China, is now grown in Southern Europe and in various parts of the United States. The several attempts which have been made to establish the culture of silk in the latter country, however, have not met with encouraging results. The fruit of these trees is a berry, which may be white, red or purple in color. Mulberries as a rule are so sweet they lack in piquancy, and are therefore inferior to the blackberry, which they somewhat resemble.

The common, or *black, mulberry* is a low, much-branched tree which bears rough, heart-shaped leaves and a purplish-black fruit; the latter is used both as a dessert and in preserving and wine making. This tree is cultivated extensively in Europe and to a limited extent in California and the Southern states. The *red mulberry,* a native of Eastern North America, is a large tree which grows from sixty to seventy feet in height, and bears a sweet, dark purplish-red berry which is also good to eat. The wood of this species is valued for building purposes, for it is fine-grained, strong and durable. Another interesting member of the group is the *paper mulberry,* native to India, Japan and islands of the Pacific, and so called because its inner bark is used by the Japanese for making paper. Inhabitants of the Pacific islands also make some of their garments from its bark.

On the whole, the mulberries are not of first importance as fruit trees, but many beautiful songsters are fond of their berries, and they should be planted to attract these welcome summer visitors.

MULE, the name applied to the offspring of the male ass and the mare, highly valued on



A CHARACTERISTIC JACK

account of its unusual powers of endurance. The animal has a large head, long ears, slim tail, short mane and pointed hoofs, and is usu-

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ally dull-brown in color. It is long lived, almost immune from disease, is able to live under poor fare, and it endures harsh treatment with fortitude. Being agile and sure-footed, it is useful as a pack animal in mountainous countries. It is extensively bred in Texas, Missouri, Mexico, Spain, France and Northwest India. Particularly valuable service has been rendered in the breeding of mules at

FINE TYPE OF HEAVY MULE

the Mississippi Agricultural Experiment Station, but probably the most famous mules in the world are those bred in Missouri. The allied powers of England, Russia and France bought many thousand Missouri mules for service in the War of the Nations after the autumn of 1914.

The total number of mules in America was about 4,500,000 in 1916. The cotton and sugar plantations of the South utilize large numbers. The price of a mule may be as high as $150, although the average is below $100.

MULE DEER, a deer of North America, so called because of its very large, furry ears. Before civilization spread to the Pacific, it might be seen in any of the open regions of the western part of the continent, but to-day its range is limited. It is about three feet, four inches high at the shoulder, has a yellowish coat and high, branching antlers.

MULLEIN, *mul'in,* or **MULLEN,** *mul'en,* the name of a group of plants containing about 100 species, three of which are seen in the United States—*common, white* and *moth mullein.* The plant grows as a weed throughout the country, and has a stalky, tall stem, ending in a spike of bright yellow flowers. The plant sometimes reaches a height of seven feet, but two to three feet is the usual growth. The leaves are thick and rough, and the whole plant is covered with downy hair. From mullein is made a medicine which is used sometimes in the treatment of coughs, nervous irritations and inflammatory pains. In early times the stalk was used for a wick and dipped into tallow. These candles were known as *hag-dips.*

MULLEIN
At left, common mullein; at right, moth mullein.

MULLENS, PRISCILLA, a Puritan maiden, one of the *Mayflower* passengers, whose romantic story is linked with that of John Alden (which see). See, also, MAYFLOWER, for list of passengers.

MÜLLER, *mü'ler,* FRIEDRICH MAX (1823-1900), a German scholar and writer, probably the greatest authority of his time on the world's languages. He was born at Dessau, in the duchy of Anhalt, and there he received his early education, but in 1836 he went to Leipzig, where he took his degree and began the study of Sanskrit. He settled permanently in England in 1846 and the next year was commissioned by the East India Company to edit the *Rig-Veda,* a history of Sanskrit literature. In 1854 he became professor of modern languages at Oxford, a position he held until 1875, during which time he published treatises on the science of language. His greatest single work was a translation called *The Sacred Books of the East.* Other published works included *Chips from a German Workshop* and *The Origin and Growth of Religion.*

FRIEDRICH MAX MÜLLER

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MULLET, *mul'et,* the name of several species of fish found in temperate and tropical waters. They feed chiefly on vegetable matter, and are famous for the quality of their flesh. The Romans considered the *red mullet* a great delicacy; Pliny states that the sum of $300 was paid for one fish. The *striped mullet,* which weighs from ten to twelve pounds, is the largest and the best of all the species. *Botargo,* a preparation from the roe of the mullet caught in the Mediterranean Sea, is a favorite relish in the south of France and in Italy. The body of the mullet is almost cylindrical. These fish are usually caught in nets.

MULOCK, *mu'lok,* DINAH MARIA. See CRAIK, DINAH MARIA MULOCK.

MULOCK, SIR WILLIAM (1843-), a Canadian jurist and statesman, at one time Postmaster-General of the Dominion and after 1905 chief justice of the exchequer court for Ontario. Through his efforts, while he was Postmaster-General, a letter rate of one penny (two cents) an ounce was established in 1898 for the United Kingdom, Canada, Newfoundland, Cape of Good Hope and Natal. This rate was later extended to other parts of the British Dominions. While he was Postmaster-General, he introduced a law providing for the creation of a Dominion Department of Labor, and from 1900 to 1905 he was its first Minister.

Sir William was born at Bondhead, Ont. He was graduated from the University of Toronto, of which he was vice-chancellor from 1881 to 1900. He began the practice of law in 1868, at Toronto, and was created queen's counsel in 1888. In 1882 he was elected to the Dominion House of Commons, of which he remained a member until 1905. On the formation of the Laurier Cabinet in 1896 Sir William joined it as Postmaster-General. He resigned in 1905 to accept the chief justiceship of the Ontario exchequer court. All problems affecting agriculture, banking and commerce have always interested him, and he is known especially as an advocate of conciliation and arbitration, both in industrial and in international disputes. He was created a Knight Commander of the Order of Saint Michael and Saint George in 1902.

MULTIGRAPH, *mul'ti graf,* a device for printing letters and other documents, so that they resemble typewritten copies. The multigraph consists of a hollow steel cylinder mounted on a horizontal axis and with parallel grooves on the surface for holding the type. The cylinder is divided into two sections, one of which revolves. The grooves in the sections are alike. Each groove in the stationary section contains all the type of the same letter, one groove containing the a's, another the b's and so on, the capitals being in one groove and the small letters in another. The set of type, or font, contains all the letters, figures, space slugs and marks of punctuation necessary to set up matter that will fill one page of letter paper, that is, a sheet eight and one-half by eleven inches.

The operator sets the type by bringing the groove in the movable section of the cylinder opposite the groove containing the desired letter and sliding the type into place. A bedplate, or *platen,* under the cylinder is so adjusted that it presses the paper against an inked ribbon that covers the type as the cylinder is rotated. The paper is fed to the machine as the cylinder revolves, and with an electric motor for power 5,000 or more copies can be printed in an hour. Machines operated by hand turn out about 1,500 an hour.

The multigraph works on the same principle as the printing press, and any number of copies can be printed from it.

MULTIPLICATION, *mul ti pli ka'shun,* the process of using a number as many times as is indicated by the number of units in another number. This subject is best approached by studying an example in addition. $6+$6+$6+$6=$24. We add as follows: $6 plus $6 is $12; $12 plus $6 is $18; $18 plus $6 is $24. As long as we add in this way, not regarding the equality of the addends, but just recognizing the sum at each addition, and the final sum, we have *addition.* But as soon as we recognize that we are using 6 four times a new element enters in—the *abstract number*—the *number* of times the number 6 is used. With this new element comes *multiplication.* The sign of multiplication is the oblique cross ×. It is read *times* or *multiplied by.*

If a child takes a step 2 feet in length, when he has taken 8 such steps he has gone 8×2 ft. or 16 ft. (read 8 times 2 ft., or 16 ft.) or 2 ft. ×8 or 16 ft. (read 2 ft. multiplied by 8, or 16 ft.). Other examples follow:

$$3¢+3¢+3¢+3¢=12¢$$
$$4\times 3¢=12¢$$

$$7\text{ in.}+7\text{ in.}+7\text{ in.}=21\text{ in.}$$
$$3\times 7\text{ in.}=21\text{ in.}$$

$$\$8+\$8+\$8+\$8+\$8=\$40$$
$$5\times \$8=\$40$$

Fig. 1 shows *4 rows,* each row containing 7 *dimes,* or 7 *rows,* each containing *4 dimes.* Each horizontal row contains 7 times 1 dime,

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and 4 rows contain 4×7×1 dime or 28 dimes. Each vertical row contains 4×1 dime, and 7 rows contain 7×4×1 dime or 28 dimes.

We see that the *product* (as the answer in multiplication is called) is the same in both

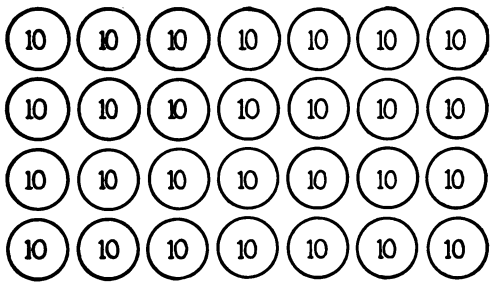

FIG. 1

cases. The number used is called the *multiplicand;* the number which tells how many times the multiplicand is to be used is the *multiplier.* But we have seen above that we may use either number as the multiplicand or multiplier, and the products are the same; for example, 6×$5=5×$6, for one equals 6×5 ×$1, and the other 5×6×$1, or each equals 30×$1; 7×8c=8×7c; 9×4 ft.=4×9 ft., and so on.

A man buys 7452 bushels of apples at $3 per bushel. What did they cost?

The cost is 7452×$3. This is an awkward multiplication. Since we know that this is the equivalent of 3×7452×$1, we multiply in the simpler way:

$$\begin{array}{r} 7452 \\ \underline{3} \\ 22356 \end{array}$$

The child learning multiplication should build up many concrete groups that he may see this *interchange of multiplier and multiplicand.* This is called commutation. He should learn many multiplication facts in building and taking apart *concrete* groups; he should use various units of measure to measure distances, finding the whole distance as a product rather than a sum. For example, he finds his table to be 7×3 inches long and 6×3 inches wide; he finds the schoolroom to be 9×3 feet long and 7×3 feet wide. Many of these facts should be learned before he formulates the *multiplication tables.* The "tables" may be built with inch cube blocks, cardboard squares, drawings on squared paper, etc. The tables should be *learned after* the facts are understood, through much concrete work. Many methods of work and play may be evolved to learn them. Cards with multiplication facts written large may be held up in rapid succession by the teacher; individuals may answer, class may answer, sides may be taken and a rival game ensue. Products may appear on cards, and the child may tell what numbers make them, as 45=9×5, 64=8×8.

A series of products may be placed upon the blackboard:

45=
32=
72=

The class fill out with correct factors, as

45=9×5
32=8×4
72=9×8

Or such a series as this may be placed on the board:

$n\times 8=72$
$n\times 9=27$
$6\times n=30$

The class go to the board, erase n and put in the correct number.

(1) $2\times 13=n$

(a) $13=10+3$

$2\times 13=(2\times 10)+(2\times 3)=26$

(b) $\begin{array}{r} 13 \\ \underline{\times 2} \\ 20 \\ \underline{6} \\ 26 \end{array}$ (c) $\begin{array}{r} 13 \\ \underline{\times 2} \\ 6 \\ \underline{20} \\ 26 \end{array}$ (d) $\begin{array}{r} 13 \\ \underline{\times 2} \\ 26 \end{array}$

In (a) we see 13 as 10 and 3; and to have 2 thirteens, we must have 2 tens and 2 threes. In (b) this is set down in more concise form. In (c) we put 2 threes, or 6, down first, and then 2 tens. In (d) we set 20 down as 2 in *ten's place.*

(2) $4\times 122=n$

(a) $122=100+20+2$

$4\times 100=400$
$4\times\ 20=\ 80$
$4\times\ \ 2=\ \ 8$
$4\times 122=400+80+8=488$

(b) $\begin{array}{r} 122 \\ \underline{4} \\ 400 \\ 80 \\ \underline{8} \\ 488 \end{array}$ (c) $\begin{array}{r} 122 \\ \underline{4} \\ 8 \\ 80 \\ \underline{400} \\ 488 \end{array}$ (d) $\begin{array}{r} 122 \\ \underline{4} \\ 488 \end{array}$

(3) $\begin{array}{r} 326 \\ \underline{3} \\ 900 \\ 60 \\ \underline{18} \\ 978 \end{array}$ $\begin{array}{r} 326 \\ \underline{3} \\ 18 \\ 60 \\ \underline{900} \\ 978 \end{array}$ $\begin{array}{r} 326 \\ \underline{3} \\ 978 \end{array}$

In the last part of (3), he holds or "carries" in mind the 10 of the 18, and adds 1 ten to 6 tens, which he gets by multiplying 3 by 2.

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(4) $456 = 400 + 50 + 6$

$$\begin{array}{r} 456 \\ \times 7 \\ \hline 2800 \\ 350 \\ 42 \\ \hline 3192 \end{array} \qquad \begin{array}{r} 456 \\ 7 \\ \hline 42 \\ 350 \\ 2800 \\ \hline 3192 \end{array}$$

Lastly, carry in mind the numbers to be added to tens and hundreds, and work in the most concise form; but do not, in teaching young children, go too rapidly to the carrying or reducing process. Let there be much of the work written out in full in the early lessons, as shown above. The final form is:

$$\begin{array}{r} 456 \\ \times 7 \\ \hline 3192 \end{array}$$

By placing a zero at the right of a digit, the digit is moved one place to the left, and the number it symbolizes is multiplied by 10, as 9, 90; 6, 60. The 9 and the 6 are moved from units place to tens place. So to multiply an integer by 10, 100, etc., annex one, two, or more zeros (see DECIMAL FRACTIONS).

$756 \times 10 = 7560$. Before the zero was annexed, 6 was 6 ones, 5 was 5 tens or 50 ones, 7 was 7 hundreds; now 6 is 6 tens or 60; 5 is 5 hundreds, and 7 is 7 thousands. The number was $700+50+6$; it is now $7000+500+60$. See that annexing a zero *changes* the *place of each digit*, and causes it to signify *10* times as much as it did before. Show what happens in each of the following:

$75 \times 100 = 7500$; $846 \times 1000 = 846000$

Multiplying when there are zeros in the multiplicand

(1) (a) $2 \times 304 = (2 \times 300) + (2 \times 4) = 600 + 8 = 608$

$$\text{(b)}\ \begin{array}{r} 304 \\ 2 \\ \hline 600 \\ 8 \\ \hline 608 \end{array} \qquad \text{(c)}\ \begin{array}{r} 304 \\ 2 \\ \hline 8 \\ 600 \\ \hline 608 \end{array} \qquad \text{(d)}\ \begin{array}{r} 304 \\ 2 \\ \hline 608 \end{array}$$

(2) (a) $3 \times 209 = (3 \times 200) + (3 \times 9) = 600 + 27 = 627$

$$\text{(b)}\ \begin{array}{r} 209 \\ 3 \\ \hline 600 \\ 27 \\ \hline 627 \end{array} \qquad \text{(c)}\ \begin{array}{r} 209 \\ 3 \\ \hline 27 \\ 600 \\ \hline 627 \end{array} \qquad \text{(d)}\ \begin{array}{r} 209 \\ 3 \\ \hline 627 \end{array}$$

(3) (a) $3 \times 4060 = (3 \times 4000) + (3 \times 60) = 12000 + 180 = 12180$

$$\text{(b)}\ \begin{array}{r} 4060 \\ 3 \\ \hline 12000 \\ 180 \\ \hline 12180 \end{array} \qquad \text{(c)}\ \begin{array}{r} 4060 \\ 3 \\ \hline 180 \\ 12000 \\ \hline 12180 \end{array} \qquad \text{(d)}\ \begin{array}{r} 4060 \\ 3 \\ \hline 12180 \end{array}$$

Multiplying by a number of two digits

$23 \times 123 = n$

$123 = 100 + 20 + 3$

$23 = \quad 20 + 3$

Below, in (a) and (b), are shown all partial products.

$$\text{(a)}\ \begin{array}{r} 123 \\ 23 \\ \hline 2000 = 20 \times 100 \\ 400 = 20 \times 20 \\ 60 = 20 \times 3 \\ 300 = 3 \times 100 \\ 60 = 3 \times 20 \\ 9 = 3 \times 3 \\ \hline 2829 \end{array} \qquad \text{(b)}\ \begin{array}{r} 123 \\ 23 \\ \hline 9 = 3 \times 3 \\ 60 = 3 \times 20 \\ 300 = 3 \times 100 \\ 60 = 20 \times 3 \\ 400 = 20 \times 20 \\ 2000 = 20 \times 100 \\ \hline 2829 \end{array}$$

$$\text{(c)}\ \begin{array}{r} 123 \\ 23 \\ \hline 369 = 3 \times 123 \\ 2460 = 20 \times 123 \\ \hline 2829 \end{array} \qquad \text{(d)}\ \begin{array}{r} 123 \\ 23 \\ \hline 369 \\ 246 \\ \hline 2829 \end{array}$$

In (c) three partial products are combined in 369, and three in 2460. In (d) the zero is dropped from 2460, and we have the usual form of multiplication. The full expression of the products, as shown in (a) and (b), helps the young student to get the *meaning* of multiplication, and should precede the more concise form, which tends to disguise the meaning.

$3008 \times 9863 = (3000 \times 9863) + (8 \times 9863)$

$$\text{(a)}\ \begin{array}{r} 9863 \\ 3008 \\ \hline 29589000 = 3000 \times 9863 \\ 78904 \qquad 8 \times 9863 \\ \hline 29667904 \end{array}$$

$$\text{(b)}\ \begin{array}{r} 9863 \\ 3008 \\ \hline 78904 = \quad 8 \times 9863 \\ 29589000 = 3000 \times 9863 \\ \hline 29667904 \end{array}$$

In (b) we see that the three zeros at the end of the second partial product need not be put down if the digits 9, 8, 5, 9 and 2 are put in their proper places. So we may have the problem in the usual form:

$$\begin{array}{r} 9863 \\ 3008 \\ \hline 78904 \\ 29589 \\ \hline 29667904 \end{array}$$

In teaching the child multiplication, there should be much work done in which the *zeros are set down, showing what the real problem is*. Through this he will the more quickly see why they need not be expressed, and find the proper *place* for the first digit.

Testing Multiplication. The child may use the two methods, one as a test for the other. He may multiply by the usual method, and test the work by employing the method in which he writes partial products in full, or he may work by the "long" method and test by the usual method. It is a safer method of testing

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than division, and is much more pleasing. *Children enjoy testing their work by this method.*

$628 \times 137 = n$

Work	Test
628	628
137	137
4396	56
1884	140
628	4200
86036	240
	600
	18000
	800
	2000
	60000
	86036

In the early days of the work, drawing on cross-section paper may be used to great advantage to clarify the multiplication and to test the work. For example, $28 \times 17 \times n$:

$$\begin{array}{r} 28 \\ 17 \\ \hline 200 = 10 \times 20 \\ 80 = 10 \times 8 \\ 140 = 7 \times 20 \\ 56 = 7 \times 8 \\ \hline 476 \end{array}$$

The drawing (Fig. 2) shows all the partial products as areas.

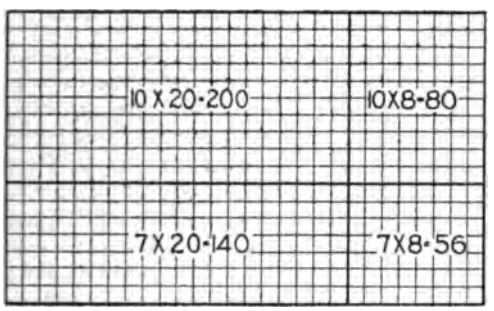

FIG. 2

One child may test another's work by drawing, or one may work the problem by drawing, and another test it by numbers. The cross-section paper is most valuable in this work. Testing in the two ways here suggested adds zest to the work, arouses a general interest in each individual's work, and brings about a feeling of responsibility on each student's part that is not felt when he must ask the teacher, or mother or father, for approval of his answer. For method of proof refer to DIVISIBILITY OF NUMBERS, subhead *Casting out of 9's.*

Problems. 1. Mollie spends 6¢ a day; how much does she spend in 7 days? 8 days? 11 days?

2. Home-made bread is 12¢ a loaf. What will 3 loaves cost? 5 loaves? 8 loaves?

3. Eggs are selling 52¢ per dozen. How much will a woman get who sells 16 dozen?

4. How many square feet in a floor 24 feet long and 18 feet wide? At 12¢ per square foot what will it cost to floor it?

5. A farmer has 27 acres of onions and the yield is 516 bushels per acre. What is the entire yield?

Solution of Problem 4

Length = 24 feet
Width = 18 feet
Number of square feet = $24 \times 18 = 432$
Cost = $432 \times 12¢ = \$51.84$

Solution of Problem 5

Number bushels on 1 acre = 516
Number bushels on 27 acres = $27 \times 516 = 13932$

Some Interesting Quick Multiplications

(a)	65	(b)	95	(c)	75
	×65		×95		×75
	4225		9025		5625

Explanation. 5×5 is 25. Add 1 to the tens of the multiplier and take the product of the tens. In (a) this product is 7×6, or 42; in (b) 10×9, or 90; in (c) 8×7, or 56.

(d)	78	(e)	84	(f)	49
	72		86		41
	5616		7224		2009

Explanation. Take product of the units: 2×8=16, 6×4=24, 1×9=9. Add 1 to the tens of the multiplier and take product of the tens: in (d) 8×7=56, in (e) 9×8=72, in (f) 5×4=20.

(g)	105	(h)	107	(i)	106
	105		103		104
	11025		11021		11024
(j)	205	(k)	307	(l)	608
	205		303		602
	42025		93021		366016

The same explanation holds in these last six as above; for example, in (k) the product of the units is 3×7, or 21; add 1 to the tens of multiplier and the product of the tens is 31×30, or 930. The reason for this is evident in the following: $75 \times 75 = (70 \times 70) + (5 \times 70 + 5 \times 70) + 5 \times 5$. But $5 \times 70 + 5 \times 70 = 10 \times 70$ and $70 \times 70 + 10 \times 70 = 80 \times 70$, which we get by adding *1* to the *tens* of the multiplier. It is seen also in the following: $87 \times 83 = (80 \times 80) + (7 \times 80 + 3 \times 80) + 3 \times 7$, which $= 80 \times 80 + 10 \times 80 + 3 \times 7$, which $= 90 \times 80 + 3 \times 7$.

Children and older students enjoy this free play with numbers, and like to mystify others with their seeming magic in performing rapid multiplications. A.H.

MUMMY, *mum'i,* an embalmed body, preserved by the process used by the Egyptians in preparing their dead for burial. The bodies

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of the wealthy received greater attention than the bodies of the poor. Embalmers were employed in various capacities to operate upon the bodies of the rich. The brain and bowels were removed, the body was washed and salted, and after certain other processes not now

EGYPTIAN MUMMIES

known was steeped for seventy days in a solution of natron (sodium carbonate). It was then washed, and each member of the body was wrapped separately in linen. The head received special attention, having several folds of muslin glued to the skin, and the whole head was enveloped in fine plaster. The bodies of the poorer classes were merely dried with salt or natron and wrapped in coarse cloths.

This process of embalming is now lost to the world, but the state of preservation in which these bodies are found after several thousand years shows that the Egyptians were masters of this profession. In some countries the conditions of soil and atmosphere are alone sufficient to preserve a body with the general appearance of a mummy. A large number of mummies, not only of human bodies, but of animals and of fish, have been found in Egypt, and many have also been discovered in Peru and Mexico. See PYRAMIDS; EGYPT, subhead *Ancient Egypt*.

MUMPS, a contagious disease occurring at any age except babyhood and old age, and manifested principally by swelling of the gland below and in front of the ear. About one to two weeks elapse after exposure, and then a pain is felt below and in front of the ear; there is also difficulty in swallowing. Swelling of the painful region comes on rapidly; the disease may involve one side only or both. This swelling makes it difficult to open the mouth or to chew. The swelling begins to subside at the end of four or five days, and if both sides of the throat have been affected, the patient never has a second attack. Rest in bed until the patient is entirely well will usually ward off complications, and should be insisted on. Warmth applied to the swelling, and medicine to relieve fever, prescribed by a physician, are measures it is well to carry out. These cases always get well. W.A.E.

MÜNCHHAUSEN, *münK'hou zen*, HIERONYMUS KARL FRIEDRICH, Baron (1720-1797), a German soldier and cavalry officer, who holds the unique reputation of being one of the greatest exaggerators that ever lived. He was born in Bodenwerder, Hanover, and in his youth served as a cavalry officer in the Russian army. His spirit was adventurous and his imagination unlimited, and he gave a ridiculously exaggerated account of his remarkable adventures and exploits in the Turkish campaign of 1737-1739. These tales were gathered by Rudolph Erich Raspe, a German exile, who published the first English edition in 1785, naming it *Baron Münchhausen's Narrative of His Marvelous Travels and Campaigns in Russia.* Another standard English edition was published by Shore in 1872, with illustrations by Doré and Gautier. On account of their humor, the stories have been very popular.

MUNCIE, *mun'si*, IND., the county seat of Delaware County, is situated in the east-central part of the state, sixty miles south of Fort Wayne and fifty-four miles northeast of Indianapolis. It is on the west fork of the White River and on the Cleveland, Cincinnati, Chicago & Saint Louis, the Lake Erie & Western, the Chesapeake & Ohio of Indiana, the Fort Wayne, Cincinnati & Louisville, the Pittsburgh, Cincinnati, Chicago & Saint Louis, and the Central Indiana railroads. Five interurban lines extend to Indianapolis, Fort Wayne and other cities. The area of the city exceeds four square miles. In 1910 the population was 24,005; in 1916 it was 25,424 (Federal estimate).

Muncie has McCullough and Heekin parks, a courthouse, Federal building, Carnegie Library and three hospitals, and is the seat of the Muncie Normal Institute. The development of the city as an important manufacturing center is due to its location in the gas belt of the state and near convenient coal fields. Glass and fruit jars, iron and steel, automobiles, silver and silver-plate goods, underwear and clothing, lawn mowers, caskets, wheels and carriage woodwork, iron bedsteads, steam boilers, gas engines and supplies are extensively manufactured. There are also several canneries.

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Muncie was named after the Munsee Indians. The town was settled about 1833 and became a city in 1865. J.E.F.

MUNDELEIN, *mun'de lin,* MOST RT. REV. GEORGE W. (1869-), a prelate of the Roman Catholic Church in America, who bears the distinction of being at various times the youngest monsignor, the youngest bishop and the youngest archbishop in the United States. He was born in Brooklyn, N. Y., was graduated at Manhattan College, New York, when twenty, and went to Rome to study at the College of the Propaganda. He was ordained a priest in 1895, was appointed monsignor in 1905, and the following year was made a member of the Ancient Academy of the Arcade, the first American to receive the honor. In 1908 he received the degree of Doctor of Sacred Theology, was consecrated auxiliary bishop of Brooklyn in 1909, and was chosen as archbishop of Chicago November 29, 1915. In the latter city he has the distinction of presiding over the most populous Roman Catholic diocese in the world. Archbishop Mundelein was the first prelate of German descent chosen to preside over the Chicago diocese.

ARCHBISHOP MUNDELEIN

MUN'GOOSE. See MONGOOSE.

MUNICH, *mu'nik,* in German MÜNCHEN, *mün'Ken,* is one of the finest cities of Germany and perhaps the richest in its treasures of art. It is the capital of Bavaria, and is situated on an extensive plateau about 1,700 feet above sea level, on the southern bank of the Isar River. Munich has become world-famous for its great school of painting, and as a musical center. It was a city of little celebrity until the reign of King Ludwig I (1825-1848), who devoted himself to its beautifying. Now it is made up of an endless succession of magnificent palaces, churches and public buildings, representative of every style of architecture, and each worthy of special description. In addition to its fine university, Munich is richly endowed with many special schools and institutes for scientific and literary study. The city is also of commercial importance, and its stained-glass works, iron, brass and bell foundries, lithographing and engraving works, and factories for the manufacture of optical and mathematical instruments are celebrated. Of equal fame are the enormous breweries of Bavarian beer, about forty-five in number, all under royal control.

The most imposing structure of the many which house fine collections of art is the Old Pinakothek, containing paintings by old masters, as well as engravings and drawings and a priceless collection of antique vases. The New Pinakothek is celebrated for the great frescoes representing the development of art; and it contains a vast collection of paintings by modern artists. The Glyptothek is devoted to sculpture, ancient and modern. The famous Bavarian National Museum illustrates the history of civilization and art. The Royal and National Library contains over 1,100,000 volumes and over 50,000 manuscripts. The Royal Palace, which forms an extensive series of buildings, has many magnificent apartments and artistic treasures; its curiosities include crystals, miniatures and a fantastic shell grotto. The festive halls are decorated with paintings from the *Odyssey.* The Königsbau, a part of the New Palace, in the style of the Pitti Palace at Florence, is noted for the series of frescoes by Schnorr, illustrating the Nibelungenlied.

The Temple of Fame is of interest not so much for its busts of illustrious Bavarians as for the wonderful statue of *Bavaria,* sixty-five feet high, standing at the head of the staircase on the terrace leading to the hall. Connected with the Royal Palace are the Court Church and the Court and National Theater, one of the largest theaters in Germany. Adjoining the palace is the Court Garden, having arcades adorned with frescoes. A short distance beyond is the English Garden, a beautiful park covering 600 acres. The famous Gasteig promenades are along the right bank of the Isar. The street types are of especial interest to the thousands of visitors who throng Munich annually.

Thus there is much of interest in this city of architectural magnificence. Most of the modern buildings have been constructed along the lines of famous structures of other countries and eras, so, as one well-known writer has said, "a walk through Munich affords a picture of the architecture and art of 2,000 years." Population, 1910, 596,460. R.D.M.

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MUNICIPAL, *mu nis' i pal,* **GOVERNMENT,** a term which popularly relates to the self-government of a city, with its many problems of local control, but which refers no less truly to the government of any incorporated village. In almost all jurisdictions a village or city is a thickly-populated section of a township whose growing needs require more complicated government and more financial strength than the remainder of the township. A city needs sidewalks, pavements, waterworks, gas plants and other modern necessities, and the needs of the village are much the same, although on a less extensive scale. Farming communities naturally object to paying taxes to support such enterprises in these thickly-populated sections of their township, inasmuch as they receive no direct benefit from such investments. A growing community is therefore empowered under nearly all state and provincial legislatures to form a corporation of all the people within certain territorial limits, which sets the prescribed area apart from its township for purely local government. The written permit to form a city, or village, government is called a charter, and is authorized by the state or province; this charter specifies distinctly the powers and limitations of the new local government.

In some states and provinces a community must have 10,000 people before it can apply for a city charter, and 500 people before it can separate from the rest of its township and organize a village government. This rule varies so much, however, that no definite statement can be made respecting it. In some states a community may organize a city government with as few as 1,000 inhabitants. While incorporation increases local expenses, yet it is true that in a village the president and members of the common council usually receive no compensation; the same is true in many small cities, but in cities of the first class the officials are usually paid adequate salaries.

Village Government. A village has for its executive head a mayor or president; its legislative department is the common council, composed of five or more members elected for one or two years. The charter provides also for a village clerk, treasurer, assessor, street commissioner and usually a village marshal. Any constable in a township may also act as peace officer in a village. The council passes ordinances which are in every sense laws binding upon all the people within the limits of the village. A village may borrow money up to a certain amount to build roads, pave streets, build and equip schoolhouses, municipal buildings, and the like.

City Government: Council-Mayor Plan. A city government is like that of a village except that it is more complex, because of the greater number of people whose interests demand protection, and whose needs are more complex. Except in cities under the commission plan, or the city-manager plan, the chief executive officer is the mayor. Legislative powers are vested in the common council, or board of aldermen. In order that representation in this body may not be concentrated in one locality, the city is sometimes divided into sections called wards, the people of each ward electing one or two members, usually for terms of two years. In other cities ward lines are abolished, and all members of the council are chosen at large, that is, by the voters of the entire city.

There is also a city clerk, a treasurer, assessor and tax collector; the department of streets is in charge of a street commissioner, and the department of public safety has a police force as large as necessary, with a chief of police at its head. This official is generally appointed by the mayor and responsible to him. The head of the street department is sometimes appointed and sometimes elected by the people.

New Types of City Government. Students of government are finding in the cumbersome city organizations serious menaces to the welfare of the community. The average city government is one of divided responsibility, although nominally the mayor is at the head of every department except the common council, or board of aldermen. Divided responsibility frequently carries with it abuses of power and privilege. A change in the governmental machinery which has found favor in a large number of cities is the so-called commission form of government, whereby responsibility for the entire civic organization is placed in the hands of five or seven men. **W.B.G.**

Consult Pollock and Morgan's *Modern Cities;* Munro's *The Government of American Cities;* Howe's *The Modern City and Its Problems.*

Related Subjects. The following articles in these volumes will be of interest in this connection:

Alderman	Commission Form of Government
City	Mayor
City Manager	Municipal Ownership
City Planning	

MUNICIPAL OWNERSHIP signifies ownership and operation by a city of such public necessities or conveniences as waterworks, light-

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ing systems, street railways, telephone systems, and the like, as opposed to private control of those same utilities. There are instances in which ownership and operation are not combined; the city, as owner, may lease operating privileges to private companies, under such rentals and restrictions as may be agreed upon.

The economic principle of publicly-owned utilities has been debated for many years. It is conceded that a city government is obligated to provide in some way the public facilities required for the conduct of business and for some of the universal demands of the homes of the people. Streets belong to the public; they must be used in part, on the surface and above and below, for means of transportation, for water-supply equipment, lighting and sewer systems, and for that newest modern necessity, the telephone. Either the city must fully control the streets by control of the public utilities placed in them, or it must relinquish a measure of its rights to private corporations.

One street-car system; one lighting plant; one telephone system; one system for supplying water—a single organization to control each of these necessities has come to be the rule in most cities. Service to the whole public in any line is regarded as a natural monopoly; there should not be competing companies. As an illustration, one telephone system in a city is a necessity; two competing companies invite confusion, are vexatious, and neither can fully serve the public. These things which are natural monopolies, if left under private ownership are sometimes difficult to control in the interests of all the people; service cannot be commanded of a grade to meet demands; not always can prices be controlled. Ownership and operation by the city place the public in command of its utilities; the vote of the people or their representatives determines the extent of service, its quality, the cost. The latter item, if affairs are wisely conducted, may be less than under private ownership, for the city does not aim at returns larger than necessary to cover depreciation. If politics can be kept out of the management, the quality of the service will depend solely upon the zeal of the city's servants.

In most communities those who object to municipally-owned utilities have valid reasons for their opposition. A city corporation is a business organization, and requires the same careful scientific and resourceful management that characterizes successful private enterprises. The men chosen to manage a city's affairs are sometimes of poor ability; some of them could not safely be placed in command of any large, private business, and should not be given control of a city's operating department. Too frequently there is the thought in the minds of a certain class of officeholders that a city is their legitimate prey, that the people are careless and will not hold them to careful account, with the result that public business suffers, while taxes mount high. Municipal ownership adds very largely to the number of a city's employees, measurably increases the responsibility of those in power, and demands the highest ability and strictest integrity in official places.

The people of the United States are not yet fully persuaded that their city governments should undertake any service except the protection of the life, property and health of its citizens. Water is supplied by the municipality in most of the large cities of the United States, as well as in many smaller ones. Of 175 cities with over 25,000 population, 133 own their waterworks. Electric-lighting plants are generally owned and operated by private companies; about 800 cities own electric-lighting plants as compared with 3,000 plants under private ownership. Municipal control of other public utilities has made even less headway. It would be difficult in most cities to establish with success municipal telephone systems; one gigantic company has a grasp on this natural monopoly from coast to coast. Local independent companies are numerous, but on their own ground they compete with their powerful national rival, and both emphasize the economic waste resulting from competition of this nature.

By far the greater number of water systems of Canada are owned by the people, and in both Canada and Great Britain the theory of municipal ownership has wider acceptance than in the United States. Some countries carry the theory farther; if a city may control a necessity, why may not the state do the same? Therefore nearly every country of continental Europe, particularly Germany and France, owns one or more railroads, as well as telegraph and telephone systems. The government's relation to such an enterprise is the same as the position of the United States with respect to its postal system. The most advanced communities in the world in the direction of municipal ownership of public utilities are the cities of New Zealand. W.B.G.

Consult Porter's *The Dangers of Municipal Ownership;* Towler's *Socialism in Municipal Government.*

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MUNKÁCSY, *moon'kah che,* MIHÁLY (1846-1900), an Hungarian painter, whose works are characterized by great dramatic power, vigor and strength. His real name was MICHAEL LIEB. Munkácsy's paintings divide themselves into three classes: historical pieces, of which *Milton Dictating Paradise Lost to His Daughters, Christ Before Pilate* and *Mozart's Last Moments* are his best known; those depicting Hungarian life, including *The Condemned, War-Time, Night-Roamers* and *Village Heroes;* and those illustrating social life of Paris, among which are *Father's Birthday* and *Two Families.* It took years of hard work, entailing many privations, before he was able to fulfil his ambition to study at Munich and Düsseldorf. In 1872 he settled in Paris, where he applied himself closely to his art.

MUNROE, *munro',* KIRK (1856-), an American story-writer, whose books for boys have been very popular, was born near Prairie du Chien, Wis., educated in the common schools, and in civil engineering at Harvard University. During later work on the Northern and Southern Pacific railways he became acquainted with wild western life, which he afterward pictured with such effect in his books. For a time he lived in New York, and was the first editor of *Harper's Young People,* but in 1882 removed to Southern Florida, and gave himself up to story-writing. His books include *The Flamingo Feather, The Coral Ship, Dory Mates, The Belt of Seven Totems, Outcast Warrior* and *For the Mikado.* His books are wholesome, not given to sensation, but not always accurate in their historical phases.

MUNSEE, *mun'se,* one of the three principal divisions of the Delaware Indians, the others being the Unami and Unalachtigo. The Munsees are frequently called the Wolf tribe of the Delawares because the wolf is regarded as their tribal symbol (see TOTEM). They themselves were in early times divided into several bands, the most important being the *Minisink,* whose name comes from an Indian word meaning *at the place where stones are gathered together.* They formerly occupied the land about the headwaters of the Delaware River in New York, New Jersey and Pennsylvania, and also had control of an extensive tract along the west bank of the Hudson River. The Munsees who dwelt on the Hudson were conspicuous in early New York history, but when the white settlements increased they joined their relatives along the Delaware. By a fraudulent treaty, known as the *Walking Purchase,* the majority of the Munsees were driven from the Delaware about 1740, and settled on lands along the Susquehanna River, which were assigned to them by the Iroquois. They are now widely scattered throughout the United States and in Canada.

MÜN'STER, one of the best preserved old towns in Germany, about 100 miles north-northeast of Cologne, is the capital of Westphalia. Its chief interest lies in the numerous remains of medieval architecture, particularly the Gothic cathedral; several fine old churches; the castle with its pleasure grounds and botanical gardens; and the sixteenth-century town winecellar, in which are preserved some rare paintings of the old German school. The University of Münster (Roman Catholic) has a library of about 225,000 volumes. The industries include the manufacture of woolen, cotton and silk fabrics and paper, in addition to dyeing, printing and enameling. Population in 1910, 90,254.

MÜNSTERBERG, *mün' ster berK,* HUGO (1863-1916), a German-American psychologist who was a leader in the experimental branch of his subject. His name became more familiarly known than the names of most philosophers, for he wrote articles and books, in popular style, on phases of psychology in which there is a general interest. His discussion, for instance, of the psychology of testimony, attracted wide attention, as did also his work on *Psychotherapy,* and especially his book *Psychology and Industrial Efficiency,* in which he proposed mental tests for vocational guidance which have proved of practical value.

Münsterberg was born in Danzig, received degrees at Leipzig and at Heidelberg, and taught for several years in the University of Freiburg. In 1892 he accepted the position of professor of psychology at Harvard University, and from the first he turned his attention to the organization of that psychological laboratory which is one of the glories of Harvard. From being interested chiefly in the relation of physiology to psychology he constantly widened his view until it embraced the relationship of psychology to all phases of life. Particularly acute were the deductions which he drew from his study of American life and ideals. He wrote much on various phases of his subject, his published works including *Psychology and Life, American Traits, Eternal Values, Science and Idealism, On the Witness Stand, American Patriotism* and *Psychology, General and Applied.* In 1910-1911 he returned to Germany as Harvard exchange professor at the University of Berlin.

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When the War of the Nations broke out in 1914, Münsterberg was severely criticized, both in the United States and Great Britain, for his extreme pro-German views, which were openly expressed in *The War and America*. Harvard University, however, upheld him, declaring that no member of its faculty should be dismissed for making use of his right to freedom of speech, and he continued teaching there until his death, which occurred suddenly from heart failure.

MURADABAD, *moo rud ah bahd'*, the capital of the district of the same name, in the Northwest Provinces of British India. The city is situated on the banks of the Ramganga River and contains several noted buildings, including an Indian mosque built in 1631, the Anglican Church of Saint Paul and the American Methodist Mission. The metal work of Muradabad, especially its engraved brass, is of exquisite workmanship and beauty. The city is the center of an extensive local trade in sugar, wheat and rice. The population in 1911 was 81,168. The city was founded in 1625 by Rustan Khan, and overlooking the river are the ruins of his fort.

MU'RAL CIRCLE, an astronomical instrument used for the calculation of the right ascension and declination of stars. It has now been superseded by the more reliable meridian circle. See ASTRONOMY.

MURAT, *mu rah'*, JOACHIM (1767-1815), a French marshal and cavalry leader, one of the best generals in the army of Napoleon I. After enlisting in a cavalry regiment he attached himself to Napoleon and in 1795 followed him to Egypt and Italy. His rise was rapid, and in 1799 he was appointed general of division by his chief, who also gave him command of the Consular Guard. In 1800 he married Caroline, the youngest sister of Napoleon, and in 1804 became governor of Paris. On the establishment of the empire he was made marshal and contributed to the French triumph at the famous battle at Austerlitz. In 1808 Napoleon placed him at the head of the army in Spain, and on August 1 of that year he was proclaimed king of Naples, under the name of Joachim I. He declared war on Austria after Napoleon's escape from Elba, but was defeated at Tolentino, and after the Battle of Waterloo he fled to Corsica. Later he made a foolhardy attempt to recover the kingdom of Naples, for which he was tried by a court-martial and shot.

MURATORE, *mu ra tohr'*, LUCIEN (1878-), a French operatic singer who ranks with the greatest tenors of modern times. This gifted artist—whose acting and singing are equally noble and impressive—is a native of the city of Marseilles. After completing a musical course in the conservatory of that city, he studied in Paris and appeared there with Calvé in *La Carmélite*. This was the beginning of a career that has been not only successful but brilliantly so. During the three seasons from 1912 to 1916 he sang with the Chicago Grand Opera organization. His portrayal of the rôles of Don José in *Carmen* and of Romeo in *Romeo and Juliet* possibly aroused the greatest interest, and critics agreed that his work in the latter opera, together with that of Galli-Curci, who sang the leading soprano part, equaled the finest achievements of those earlier stars of grand opera—Jean de Reszke and Melba. Other operas in his repertoire include *Pagliacci, Manon* and *Francesca da Rimini*. His wife, Lina Cavalieri (which see), is one of the most beautiful and accomplished singers in opera.

MURCIA, *mur'shi a*, a city in Southeastern Spain, capital of the province of the same name. It lies in the midst of one of the most fertile and most beautiful valleys of the country, on both banks of the Segura River, twenty-five miles west of the Mediterranean Sea. Promenades and pleasure gardens stretching along the river banks, and the luxuriant vineyards, and mulberry, fig and olive groves of the fruitful valley lend charm and interest to the city. Murcia has been successively under the control of the Romans, Moors and Spaniards, and one may still see traces of its former days in a few narrow streets with their quaint balconied houses. The most interesting feature of the place is the great cathedral, in Gothic-Romanesque style, begun in the fourteenth century. The palace of the bishop is also notable, being one of the finest in Spain. Silk-making is the most important industry. There is a thriving trade in grain and fruit, and the city has manufactures of woolen goods, gunpowder, soap, leather, hats and musical instruments. Population, 1910, 125,057.

MUR'DER, one of the few crimes still punished, in many countries, by death, may be defined as the malicious killing of a human being (see MALICE; CAPITAL PUNISHMENT). Except in the United States, the law recognizes no classes or degrees in murder. But most of the states of the American Union have by legislative enactment classified the crime in two or in three degrees. Murders of the first degree

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include those cases where the act was committed with proven malicious intent. The second degree includes cases where, though ill will is present, murderous intent is not established beyond doubt. The third degree includes accidental killing by one engaged in a felonious act. The usual punishment for the first degree is death or life imprisonment; for the second degree, imprisonment for a long term; for the third degree, imprisonment for a period varying from three to five years.

Murder is ordinarily distinguished from *manslaughter* by the presence of *malice,* especially of *malice aforethought.*

Related Subjects. The reader is referred to the following articles in these volumes:

Capital Punishment	Criminology
Crime	Manslaughter

MURFREE, *mur'fre,* MARY NOAILLES (1850-), known in the literary world by the pen name of CHARLES EGBERT CRADDOCK, was born at Murfreesboro, Tenn. Early deprived of childhood sports because of lameness, she became an intense reader of books. During the War of Secession she was taken for safety into the Tennessee mountains, and there the curious primitive characters and simple life aroused her literary talent. In May, 1878, she began her contribution of vivid stories to the *Atlantic Monthly;* in 1884 came the collection *In the Tennessee Mountains,* which was followed by *Prophet of the Great Smoky Mountains, Keedon Bluffs, Old Fort Loudon* and *In the "Stranger People's" Country.* Her stories contain vivid presentations of strange scenes and eccentric characters, while her plots are full of vigorous action. She has made the Southern mountains a field of genuine literary importance in American literature.

MURFREESBORO, *mur' freez bur o,* or **STONE RIVER,** BATTLE OF, a battle that ended the second year of the War of Secession, fought on the Stone River near Murfreesboro, Tenn., on December 31, 1862, and January 2, 1863, between a Federal force of about 41,000 under General Rosecrans, who had succeeded Buell in command, and a Confederate force of about 35,000 under General Bragg. On the first day of the battle the Federal forces were driven back; the entire right wing of the army was scattered, and some of the generals thought best to retreat; but Rosecrans announced his intention to "fight, or die here." On January 2, after the two armies had bravely held their ground with varying fortunes for nearly three days, Bragg retreated about thirty miles and stood as a barrier against the advance of the Federal troops toward Chattanooga, an important strategic point. Each army lost about 9,000 killed and wounded.

MURIATIC, *mu ri at'ik,* **ACID.** See HYDROGEN CHLORIDE.

MURIL'LO, BARTOLOMÉ ESTEBAN (1617-1682), called the "Painter of Heaven," is one of the greatest of painters. Had he only given to the world his studies of the little sun-browned street urchin and gypsies he would have been famous, but his religious paintings far surpass these in beauty and depth of feeling. Unconscious of their rags, the little street beggars bask in the sun, relishing their macaroni or luscious fruits, or eagerly engaged in tossing coppers and playing other games the children love; while his monks, saints and Madonnas are famed for their wondrous spirituality.

MURILLO

The story of Murillo's early life is one of great poverty and suffering. He was born in Seville of humble parents whose struggles for existence were so great that they had little time to devote to their boy, but he was perfectly happy when allowed to draw upon the pages of his books or the walls of his poor home. Murillo began his life work by painting religious pictures for the fairs of Seville, and later executed commissions for the South American trade. Then he started on a long and tedious walk from Seville to Madrid, arriving there exhausted, friendless and penniless. However, he was blessed with an almost limitless fund of courage and a determination to succeed against all odds. Velasquez, his townsman, became interested in his work, and through his influence a new, wonderful world was revealed to the struggling young artist. Velasquez, at that time painter to the king, offered Murillo a home and gave him permission to work in his studio. But best of all was the privilege of studying and copying the treasures of the Royal Galleries.

Like all the painters of his day, Murillo had once dreamed of going to Italy. But when the opportunity came and Velasquez presented him with letters of introduction to the famous men

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IMMACULATE CONCEPTION

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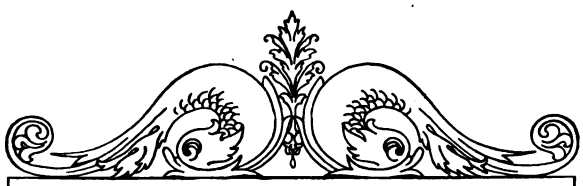
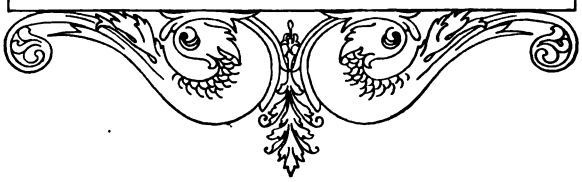


IMMACULATE CONCEPTION. "An inspired man," the critics call Murillo, and everyone who looks upon his paintings of sacred subjects feels the justice of the praise. That he felt deeply, and therefore was able to make others feel, is as apparent in his pictures as is his knowledge of drawing and his mastery of warm, soft coloring. His paintings for the most part show no struggle, as do many of those of Michelangelo, for instance, but diffuse an air of serene well-being. "We seem," says one writer in describing his pictures, "to exist in one of those happy moments when grief is afar off and when the sweetest affection of the human heart is gratified and all life is serene." It is this quality in his paintings which accounts in large measure for his vogue, for Murillo is one of the most popular of the great artists.

This particular picture is Murillo's latest and most finished presentment of the Virgin. With its sweetness and ideality, it has always been a favorite; during the Napoleonic wars Marshal Soult felt that he was bestowing a great boon on France when he brought it back from Spain at the close of his campaign there. Later, the French government bought it, paying for it about $125,000, the greatest sum ever paid for a picture up to that time.

L. J. B.



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there, he declined, choosing rather to return to his home at Seville, where he remained for the rest of his life. His eleven large paintings for the convent of San Francisco brought him immediate fame and many other commissions. He founded the Academy of Seville in 1660 and acted as its president the first year. He painted *Saint Anthony of Padua* several times, the most famous canvas on this subject being the one in the Cathedral of Seville, representing the monk with arms outstretched to receive the Infant Jesus. The lilies in this painting are so real that it is said the birds flying about the cathedral have tried to peck at them.

Murillo's masterpiece, the *Immaculate Conception,* hangs in the Louvre. The Virgin is borne upward by heavenly zephyrs. She wears a flowing white robe and simple blue mantle. Out of the golden light, or peeping from behind soft clouds, are countless cherub faces, each having a special charm and interest. A faithful reproduction, much reduced in size, is shown in the accompanying color plate. Among the eight famous paintings for the almshouse at Saint Jorge are *Moses Striking the Rock, Abraham and the Angels, The Miracle of the Loaves and Fishes* and *Saint Peter Released from Prison. The Dice Players* is typical of his many famous presentations of Spanish children of the street.

In 1681 Murillo went to Cadiz. While there he received injuries in a fall from a scaffold which resulted in his death. He was buried in the Church of Santa Cruz, in Seville. Examples of his paintings are the treasures of the great galleries of the world. A stately bronze statue of him in the public plaza of Seville is pointed out to all visitors, for the Spanish people treasure the memory of this great master of painting. B.D.M.

Consult Stirling-Maxwell's *Annals of the Artists of Spain;* Curtis's *Velasquez and Murillo.*

MURRAY, *mur'a,* GEORGE HENRY (1861-), a Canadian statesman, since 1896 premier of Nova Scotia. He was born at Grand Narrows, N. S., and received his elementary schooling there, but later attended Boston University. In 1883 he was called to the bar of Nova Scotia, and for several years thereafter practiced his profession at North Sydney, N. S. His first appearance in public life occurred in 1889, when he was appointed a member of the provincial legislative council. Two years later he resigned to contest a seat in the Dominion House of Commons. After his defeat for this seat he was reappointed to the council, and at the same time became a minister without portfolio in the Liberal cabinet of William Stevens Fielding. In 1896, when Fielding was called to Ottawa to serve in the Dominion Cabinet, Murray succeeded him as premier of Nova Scotia. He also assumed the portfolio of provincial secretary. During its long service the Murray government has given special attention to the promotion of agriculture and immigration. In 1914 a determined effort was made to force the province to adopt prohibition, but Premier Murray's opposition finally led to a compromise in the form of a local option law.

MURRAY, JAMES (1719-1794), a British soldier and colonial administrator, the first British governor of Canada. Murray was the younger son of an English nobleman, and, like many younger sons, entered the army when he became of age, in 1740. After service in the West Indies, the Netherlands and Brittany, in the course of which he rose to the rank of lieutenant-colonel of the Fifteenth Regiment of Foot, Murray was sent to America in 1757 with his regiment. In the next year he commanded a brigade at the siege of Louisburg, and in 1759 he was one of the three brigadiers under Wolfe in the expedition against Quebec. In the great battle on the Plains of Abraham he commanded the left. After the British victory Murray was left in command of the city, which he successfully defended against a superior French army under General de Lévis.

In 1760 the king appointed General Murray governor of Quebec, and three years later, when French rule formally came to an end, governor of Canada. As governor Murray faced many difficult problems, nearly all of which centered about the relations between the English and the Indians (see PONTIAC) and the English official class and the French-Canadians. Murray seems to have been just beyond criticism, but some of his subordinates accused him of favoritism towards the French. Accordingly he was recalled to England in 1766, and was even compelled to stand trial, but was completely exonerated of any wrongdoing. From 1774 to 1781 he was governor of Minorca, which he surrendered to a combined force of French and Spanish troops after a seven-months' siege in the latter year. He was made a general in 1783.

MURRAY, SIR JOHN (1841-1914), a Canadian naturalist, geographer and deep-sea explorer, perhaps the foremost authority of his day on oceanography and marine biology. Sir John was born at Cobourg, Ont., attended Victoria

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College there, and later studied natural science at the University of Edinburgh, in Scotland. His first practical experience in the field in which he became a leader was in 1868, when he visited the Arctic regions on a whaler for the purpose of studying their plant and animal life. From 1872 to 1876 he was one of the naturalists on the famous "Challenger" expedition, which explored the ocean basins and gave the world a new knowledge of its great water masses. On the return of the expedition he was appointed an editor to assist in the preparation of its reports, and in 1882 was promoted to the position of editor-in-chief. These reports, comprising fifty large volumes, were not completed until 1896. Two years later Queen Victoria knighted him. Sir John took part in a number of other important exploring expeditions and wrote numerous reports on the oceans. He was also the author of *The Ocean: A General Account of the Science of the Sea,* a highly entertaining account in language which is clear but not technical.

MURRAY, WALTER CHARLES (1866-), a Canadian educator, since 1908 president of the University of Saskatchewan. He was born at Studholm, N. B., and was educated at the universities of New Brunswick, Edinburgh and Berlin. After completing his studies at Berlin in 1891, he returned to the University of New Brunswick as professor of philosophy and economics. A year later he was called to Dalhousie University, where he was until 1908 professor of philosophy and lecturer on education. Thereafter his abilities have found an outlet in the position of president of the University of Saskatchewan, which has become, in a large degree through his efforts, one of the great Canadian universities. Murray is the author of *Studies in Mind Growth* and *Local Government in the Maritime Provinces.*

MURRAY RIVER, the largest river in Australia, rises in the Australian Alps, near the eastern boundary of Victoria. It is about 1,500 miles long, and drains nearly the entire southeastern quarter of the continent. In its upper course it is a rushing mountain stream, but it slows down and widens as it reaches the great Australian Plain. For about two-thirds of its course it flows in a northwesterly direction, forming the boundary between Victoria and New South Wales. It then flows into South Australia, passes through the shallow Lake Alexandrina and empties into the Indian Ocean through Encounter Bay. During the rainy season the Murray is navigable over most of its course as far as Albury, New South Wales. Although there are many inland ports along its banks which do a large trade, the mouth is impeded by sand bars and so is inaccessible for large steamers. Its chief tributaries are the Murrumbidgee and the Darling rivers.

MURRUMBIDGEE, *mur um bid' jee,* an Australian river that flows across the southern part of New South Wales. It rises in the Australian Alps and twists and winds northward and westward for 1,350 miles until it reaches the Murray River (which see). During the wet season it is navigable for light steamers for 500 miles, but during the dry season it is of little value except to a few ranches along its course.

MUSCAT, or **MUSKAT,** *mus kaht',* the capital of the independent state of Oman, Arabia, and a seaport of considerable strategic and commercial importance. It is situated on the Gulf of Oman, in the southeastern part of the country. Muscat is under British political influence and has been used as a coaling station by France since 1898. Its situation at the foot of high cliffs makes it one of the hottest places in the world; the excessive heat forces many of its merchants to reside in Mattra, about three miles distant, where there are cooling sea breezes. The inhabitants of Muscat carry on a prosperous trade in dates, mother-of-pearl, dry fish and salt. Muscat and the neighboring town of Mattra have a combined population of about 24,000.

MUSCATINE, *mus ka teen',* IOWA, the county seat of Muscatine County, situated on the eastern state boundary, on high bluffs along a great bend of the Mississippi River. It is twenty-five miles west and south of Davenport, with which it is connected by an electric interurban line, and is on the Chicago, Milwaukee & Saint Paul, the Chicago, Rock Island & Pacific and the Muscatine North & South railroads. A large bridge crosses the river at this point. The area of the city is nearly seven square miles. In 1910 the population was 16,178; in 1916 it was 17,500 (Federal estimate).

Its industrial establishments include foundries and machine shops, sheet iron, boiler and engine works, pickle and canning factories, and manufactories of pearl buttons (an extensive industry using fresh-water clam shells exclusively), lumber products, pottery, boxes and packing cases, carriages and tile. The city has a public park, Musser Public Library, hospitals and a soldiers' monument. The place was settled in 1833 and was incorporated in 1839. It is governed under a charter adopted in 1851.

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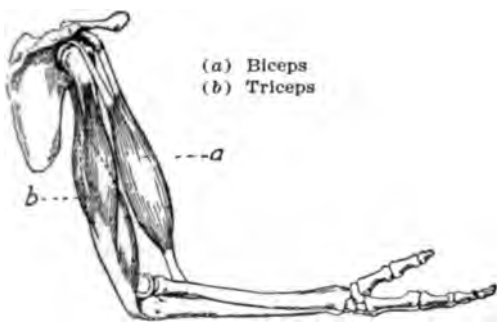
MUSCLE READING. See MIND READING.

MUSCLES, *mus''lz.* When a person walks from one place to another, picks up his food, puts on his clothing or performs any other of the countless movements that are a part of everyday life he calls to service certain important bodily organs known as *muscles.* There are over 500 of these in the human body, and they constitute fully half its weight. They are the lean flesh of man; the muscles of a cow form the lean meat of beef, and those of a pig the lean meat of pork. There are two great classes of muscles, *voluntary* and *involuntary.* Intermediate between these is heart muscle, which, though it acts like an involuntary muscle, is similar to a voluntary muscle in structure.

Voluntary Muscles. These are the muscles which move according to the will of a person and are under his direct control, as the ones used in walking, swimming or playing ball. These muscles are for the most part placed next to the bones, and they serve not only as movement organs, but also to round out the figure and so impart beauty to the body. In its typical form such a muscle consists of a soft red middle portion which tapers towards each end; it is attached to some part of the bony framework by white, inelastic cords called *tendons* (which see). When the middle portion is stimulated through its nerves it contracts, and in so doing it exerts a pull on the tendons. This pull is then transmitted to the part to be moved. A muscle which has two divisions at one end is called a *biceps* muscle (two-headed),



BICEPS AND TRICEPS MUSCLES

as that in the front of the arm between the shoulder and elbow. When the elbow is bent this muscle swells and becomes thicker and harder; a biceps "hard as a rock" is the boast of many a schoolboy who leads an active life. A *triceps* (three-headed) muscle, like that at the back of the upper arm, has three divisions.

According to structure a voluntary muscle is made up of bundles of fibers about an inch long and about 1/500 of an inch wide, each the development of a single cell. Under the microscope these fibers are seen to be marked crosswise with fine alternating bands of dark and light. From this comes the name *striated* (striped) muscle, which is another term for voluntary muscle. The bundles of fibers are enclosed in an elastic sheet of thin membrane called the *sarcolemma,* a word meaning *rind* or *skin;* they are supported and protected by connective tissue, penetrated by nerves from the cerebrospinal system and supplied with blood vessels. Some voluntary muscles, such as those which are concerned in the process of breathing, are both voluntary and involuntary in respect to function. That is, breathing may be controlled by the will, but ordinarily it goes on mechanically, and during slumber its action takes place without the least exercise of the will.

Involuntary Muscles. The involuntary muscles are those whose contractions are beyond a person's control, and which lie in the walls of such organs of the body as the stomach, intestines and arteries. No effort of the will can move such muscles. The muscles which by their contraction and relaxation move the food about in the stomach belong to this class. Structurally they are said to be *unstriated,* or not striped, for they lack the crossbands characteristic of striped muscles. Involuntary muscles are made up of elongated, spindle-shaped cells, each of which tapers towards its ends and has a central nucleus. These cells vary in length from 1/500 to 1/100 of an inch, and are from 1/6000 to 1/4000 of an inch wide. Involuntary muscles are penetrated by nerves from the sympathetic system (see NERVOUS SYSTEM).

Muscular Development. Weak, flabby muscles are an indication of physical inactivity, for muscles grow larger and stronger through use. Systematic development of these organs stimulates the fundamental processes through which life is sustained—digestion, circulation and breathing—and the whole body will therefore grow more vigorous if the muscles are properly exercised. For this reason, walking, rowing, swimming and other forms of exercise and recreation should be practiced by everyone, especially by those whose work keeps them inactive several hours each day. Boys and girls who have allowed themselves to grow stoop-shouldered can strengthen the weak and inactive muscles of the back by proper exercise;

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this is immeasurably preferable to shoulder braces, for the latter weaken the muscles.

It should also be borne in mind that alcoholic drinks diminish both the strength and the enduring power of the muscular tissues, besides interfering with the accuracy and precision of their movement. Abstinence from such beverages and from tobacco, together with wholesome living and outdoor exercise, will give to the growing boy or girl that which has been considered the ideal state for mankind since the days of the ancients—"a sound mind in a sound body." W.A.E.

MUSCLE SENSE, or **MUSCULAR SENSE,** generally called the "sixth sense," is the one which tells us which muscles to use, where to direct their movement and how much force to put into the action. This sense can be cultivated to a great degree, and because of this it is possible to develop skill and dexterity in manual labor, dancing, skating or any form of physical expression. Both sensory and motor nerves are distributed through the muscles. The muscular sense is stimulated to action through the sensory nerves, which convey the impressions they receive to the proper brain centers, and these centers stimulate the motor nerves, which cause and control muscular action. The muscular sense may also be stimulated to action through the feelings; that is, in certain manifestations of joy, anger, etc. See REFLEX ACTION; SENSES, SPECIAL. W.A.E.

MUSES, *mu'zez.* As every river, mountain and tree had its particular deity, according to the ancient Greeks, so did every art and science, and the goddesses who presided over these latter were called the Muses. They were beautiful maidens, nine in number, the daughters of Jupiter and Memory, and they were grave or gay according to the special subject over which they presided. Thus Terpsichore and Thalia, Muses respectively of the dance and of comedy, were merry of aspect, while Melpomene, the Muse of tragedy, was of serious mien. At all the feasts of the gods on Olympus the Muses sang in chorus, often with Apollo, whose special attendants they were. The Muses and the departments over which they presided were, in addition to those mentioned above, Calliope, the department of epic poetry; Euterpe, lyric poetry; Erato, love poetry; Polyhymnia, sacred poetry; Clio, history; and Urania, astronomy. An ancient writer, beginning any weighty work, always called upon one of the Muses to assist him. Thus Homer, addressing Calliope, begins his *Iliad* with the words:

> Sing to me, goddess, the wrath, the wrath of Pelian Achilles.

In modern times the term *muse* is used generally to signify poetic inspiration. "My muse has deserted me!" exclaims the poet who cannot find the thoughts or words he seeks. F.J.C.

MUSEUM, *mu ze'um,* from the Greek word meaning *temple of the Muses,* is a building in which works of art, science or learning are displayed. This is the broadest use of the term. In popular phraseology it is more customary to speak of a building which houses scientific collections, historic relics, etc., as a *museum,* and to apply the term *gallery* to those containing works of art. The first museum was the famous University of Alexandria, which sheltered scholars from all parts of the civilized, pagan world. See ALEXANDRIA.

When learning languished, during the Middle Ages, museums were practically unknown, and such collections as existed were made in the most haphazard fashion. Indeed, the development of museums on the present imposing scale is quite recent. With the enormous extension of the democratic movement in the nineteenth century, these universities of the people began to be enriched with priceless treasures of art and learning. Their purpose is educational, and the ideal museum would exhibit, as far as possible, the whole complex history of culture. Such a museum is yet, of course, but an ideal in the minds of scholars.

Among the great museums of the world are the Vatican in Rome, the Louvre in Paris, the Uffizi and Pitti at Florence, and the British National Museum at London. The Smithsonian Institution at Washington was the first of the sort in the United States. Its success led to the establishment of the National Museum. Many of the great cities now have considerable collections, suitably housed. Among those worthy of note are the Carnegie Institute at Pittsburgh, the museum at Philadelphia, founded after the Centennial Exposition, the Museum of Natural History, Boston, and the Field Columbian Museum, Chicago.

Related Subjects. The reader is referred to the following articles in these volumes:

British Museum	National Museum of the United States
Education, subtitle *Educational Museums*	Painting
Field Columbian Museum	Pitti Palace
Louvre	Smithsonian Institution
	Uffizi

MUSEUMS, EDUCATIONAL. See subtitle, in article EDUCATION, page 1950.

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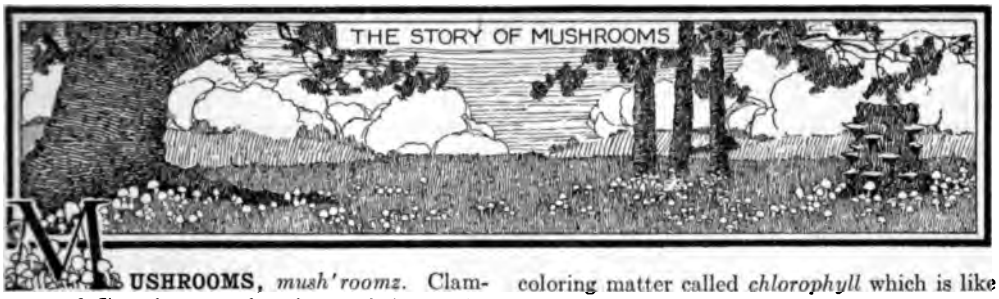

MUSHROOMS, *mush'roomz.* Clammy and flowerless are the plants of the mushroom family, a branch of the great fungus group, yet they are among the most interesting and beautiful things to be seen on a tramp through woods or fields. The fruit seen above the ground assumes a vast variety of shapes, from the ordinary umbrella to the less familiar coral-like formation. In color mushrooms range from pure white to delicate pastel shades of pink and lavender; from pale yellow to flaming orange and brilliant red; from dull gray to velvety brown.

A spell of wet weather in spring, summer or fall always means a sudden increase in mushroom growth, for the plants require a great deal of moisture. The home they choose is decaying vegetable matter—generally a log or a piece of rotting wood, sometimes hidden under leaves or moss. It is the French word for *moss* that gives us the name *mushroom,* as well as the old-fashioned name *mushrump.*

Children usually group all mushrooms under the single term, *toadstool*—properly applied only to the unwholesome kind—and shun them all as poisonous. Perhaps this is fortunate, for while many kinds of mushrooms may be eaten with safety and relish, there are others, looking so much like them that only an expert botanist or a very careful observer can tell them apart, which are rank poisons; and between these two extremes are many that cause temporary illness, even though not usually fatal. There is a little poem by Walter Learned that reads:

Five little white-heads peeped out of the mold,
When the dew was damp and the night was cold,
And they crowded their way through the soil with pride:
"Hurrah! we are going to be mushrooms!" they cried.
But the sun came up, and the sun came down,
And the little white-heads were withered and brown:
Long were their faces, their pride had a fall—
They were nothing but toadstools, after all.

How the Mushroom Gets Its Food. Like other fungi (which see), mushrooms lack that green coloring matter called *chlorophyll* which is like a fairy cook to ordinary plants, preparing their food from the soil and air and water, with the sunlight acting as assistant chef. Without this "leaf green," the mushroom lives by appropriating the food which some other member of the vegetable kingdom has manufactured. As a rule it is satisfied to feed upon an old stump or upon decaying twigs; but now and then it will attack the trunk or branches of a living tree, and unless it is removed it is certain to injure the tree's health.

Its Life Story. The history of the common table mushroom will give a good idea of how all the members of the family grow, even though there is some variation in different species. (See picture showing how the mushroom grows.) The tiny button shoving up through the earth is the baby mushroom. It shoots up very quickly—sometimes overnight, when there is plenty of moisture—and the top keeps swelling until there is an umbrella-shaped *cap* and a *stem.* The skin on the underside of the cap splits again and again, forming many thin plates called *gills,* hanging like curtains and radiating from the center. Some mushrooms have a little ragged frill or *ring* around the stem near the top—what is left of the membrane which in the button stage covered the gills like a veil; while the *cup* seen at the bottom of the stem in certain varieties is the membrane that enclosed the young plant and was broken through as the plant pushed itself upward. The table mushroom has no cup, and puffballs never develop even a stem. All over the surface of the gills are tiny dots containing the *spores*—minute, dark-colored grains that perform for the mushroom the same service a seed performs for a flowering plant. When the mushroom is perfectly ripe the spore drops; if it falls into earth that is moist and rich it will swell and burst, dividing and redividing, until by and by there will be formed a network of slender fibers resembling white felt. This woolly mass is called the *spawn*—or, to use the botanical word so often met with in print, the *mycelium.*

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The spawn is the real plant, the part that gardeners sell to those who go into the business of raising mushrooms. The part above the ground is only the *fruit,* pushed up by the spawn whenever the soil is wet enough to permit it to reproduce itself, which is done by means of the spore-bearing body.

What Makes "Fairy Rings." Sometimes lawns or meadows are marked by circles of lighter grass, for which the popular name is "fairy rings." It is the feeding habits of the mushrooms that are responsible for these circles, and not the nimble feet of frolicking elves wearing out the grass, as used to be told in tales to children. Because the parent plant so quickly uses up all the proper mushroom food in the spot where it grows, its spores must fall outside the family homestead if they are to develop. Thus, as new mushrooms spring up one by one, they mark out a circle where for a time the grass grows less luxuriantly because so much of the food has been taken out of the soil. After the mushrooms have decayed, however, this circle grows a richer grass than the rest of the lawn on account of the fertilizing effect of their remains.

The Big Mushroom Family. There are about 38,000 known members in the mushroom family, differing almost as much in characteristics as would the same number of representatives of the human family. It is easy to understand, therefore, why it would not be possible to describe or even list all of them in this article. Each one has an elaborate Latin name by which the botanist classifies it in its proper group, but most of them have familiar names, also, which they have acquired through some peculiarity of form or color or habit of growth.

The Edible and Harmless Kinds. Among the thousand or more varieties that are good to eat, the largest class is that of *agarics*—a word that comes from the Latin word for *field,* since all the mushrooms of this kind grow in pastures, lawns, and open, grassy fields. The *common table mushroom* (see illustration) which is the only variety cultivated for the market on a large scale, belongs to this group. In France it is called a *champignon,* from the French word *champs* meaning *field.* It never grows very large, its spores are brown, it has no cup, and its gills are a delicate pink when the plant is young, turning to dark brown as it grows older. These are important points for the mushroom-picker to remember. The wild variety is found most abundantly in the fall or late summer. Other members of this branch are the *oyster mushroom* and the *horse mushroom,* which is similar to the common mushroom, but very much larger and less easily digested. The *parasol mushroom* is taller and is quite graceful, looking like a miniature white or delicate tan umbrella on a slender handle. The edible *amanitopsis* (see illustration) must never be confused with its cousin, the deadly *amanita,* or *death cup,* which has a frill that is lacking in the wholesome mushroom which so closely resembles it.

Among other interesting members of the edible branch of the mushroom family are the delicious *morel,* with its honey-combed cups looking like a cone-shaped sponge, whose favorite birthplace is among leaves or wood-ashes; the dainty, reddish-yellow *chanterelle,* or *little goblet,* so called because of its cuplike form; the branching *coral mushroom,* with its exquisite pink, lavender or amber coloring, most commonly seen in Sweden; the *golden clavaria,* another branching variety the color of honey, which is not only rarely beautiful but most palatable as well. Then there are the familiar *puffballs,* also called *smokeballs* and *devil's snuff-boxes,* tempting one to strike them with a twig and see the tiny puff of "smoke," which means they are scattering their dusty spores to the four winds; the *fairy-ring mushrooms,* which are often dried and preserved for eating and have a flavor like nuts; the *horsetail,* or *shaggy-mane mushrooms,* the *bear's head* and the *hedgehog mushrooms.* The *ink-cap* lives for a long time underground, shoots up overnight in thick clusters, and by the close of the day has dripped away in an inky liquid, as if supplying the tears for its own funeral. Some of the more uncommon kinds are the *jew's-ear,* of which the Chinese are so fond that they import them from the South Sea Islands; the *green russula,* looking like the trumpet of a gray-green morning-glory; the cup-shaped *golden peziza,* lined with orange-red; the *trembling mushroom,* a quivering, jellylike mass; and the *liver fungus,* sometimes called *vegetable beefsteak.*

A very beautiful and interesting mushroom is the *water-measuring earth-star,* one of the puffball group. Its outer covering bursts into a starlike form, leaving the ball in the middle. The points lie flat when the air is damp, but in dry weather they curl up and let the wind roll the plant about, scattering spores as it travels. One injurious variety is the curious *bracket mushroom,* which encircles tree trunks with its miniature shelves painted green or brown.

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MUSHROOMS

Parasol mushroom. Edible.

Parts of mushroom.

Common variety, cultivated in caves or cellars.

Death cup. Poisonous.

Oyster mushroom. Edible.

Amanitopsis. Edible.

Delicious morel. Edible.

Fly mushroom. Poisonous.

Inky cap. Edible.

Chanterelle. Edible.

Water-measuring earth-star.

Different stages in the life of the table mushroom.

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The Poisonous Kinds. The most dreaded of the poisonous mushrooms are two members of the *amanita* group, one called the *death cup,* and the other the *fly amanita.*

The *death cup* grows in the woods from June until fall. Its poison, for which there is no antidote known, acts like that of the rattlesnake, separating the corpuscles of the blood from the serum. The only hope for anyone who has eaten this mushroom is the prompt use of the stomach pump; but there are so few cures that it is small wonder one variety of this innocent-appearing plant has come to be known as the *destroying angel.* Although it is so often mistaken for the common mushroom that comes to our tables, a careful observer could not be misled, for it has white gills, white spores and the fatal "poison cup," whereas the edible plant has pink gills, brown spores, and no cup. Many of the mistakes that are made come from eating it in its button stage, when it is not yet sufficiently developed to show its true character.

The *fly mushroom* "looks good enough to eat" as it flaunts its bright red, yellow or orange cap in the woods or along the roadside. Yet the growing plant is surrounded by dead flies, a few drops of its juice in a saucer make a very powerful fly poison, and taken into the human system it paralyzes the nerves which control the heart action. It is a matter of history that a czar of Russia (Alexis) died from eating this mushroom. Nevertheless, it is not quite so deadly as the *death cup* if the stomach is promptly emptied and injections of atropine given. The earmark of this poisonous mushroom is its combination of scaly cap and stem, deep frill at the top, bulbous base and white spores.

There are other dangerous varieties, like *Satan's mushroom,* the *emetic russula* and the *verdigris mushroom,* all of which are poisonous to some people and not to others. A most offensive mushroom is the *stinkhorn,* sometimes called the *fetid wood witch,* which often grows in backyards or under open stairways, until it is finally located by its sickening odor and promptly uprooted. (See illustration under FUNGI.)

Suggestions for Picking Mushrooms. So much experience and knowledge and such a well-trained power of observation are necessary to tell the edible mushrooms from their poisonous relatives, beyond the possibility of a doubt, that the safest rule is never to gather any variety for the table unless some one on whose knowledge you can depend has pointed it out as edible and taught you to recognize its essential characteristics.

The buttons of wild-growing mushrooms must never be picked for eating, for the plant is then too young to show positively to what class it belongs. The market variety, however, is nearly always gathered in the button stage. It is wise to reject all mushrooms which have either a cup or a swelling at the base of the stem, particularly if the gills are white, for this is a fairly-safe indication of danger. As the cup is often hidden under earth, moss or leaves, it is absolutely necessary at all times to dig up the entire plant in order to avoid mistakes.

Mushrooms must be fresh when eaten. No mushroom that shows the least sign of decay, or on which insects have been feeding, should ever be eaten, nor any that have a milky juice, unless the juice is reddish.

The beginner can safely trust himself to pick the coral mushrooms, morels and puffballs, as none of these are on record as harmful, though not all are palatable. Some mushrooms grow to be a foot across, and such a specimen will be enough for several families.

Some people class all highly-colored mushrooms as poisonous, but this is incorrect, as some of the most brilliant are among the most wholesome. Just as unfounded is the popular notion that only the poisonous varieties, when cooking, will make a silver spoon turn black; many edible kinds produce the same effect. There are definite rules for testing mushrooms by careful nibbling and then studying the effects, but such testing cannot safely be indulged in by the amateur.

Mushrooms as Food. From very early times mushrooms have been used as a food. The Greeks and Romans used to eat them, and today they form the chief food of the natives of Tierra del Fuego and some parts of Australia. They are used much more extensively in Europe than in America. In most countries mushrooms are looked upon as a table delicacy rather than a substantial food, for when analyzed they prove to be about eighty-eight per cent water, with almost a half of the remaining bulk indigestible. Experts on food values state that mushrooms are not more nourishing than juicy cabbage leaves would be. There are various ways of preparing them for the table—by baking, frying, broiling, stewing, or as a salad—and most of the edible varieties can now be bought at any season in canned or dried form.

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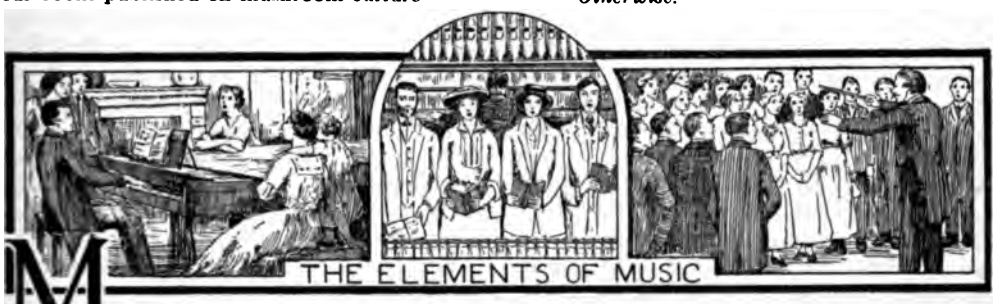
Mushroom culture is an industry that is rapidly growing in popularity, as it pays well, is not difficult to understand, and can be carried on at small expense in cellars, caves or old quarries—almost any place where it is possible to maintain a steady temperature. It is not an unusual thing for boys and girls to help in the work of raising regular crops for the market, and in this way many a college education has been made possible. There are many helpful books published on mushroom culture (see below), and useful handbooks on the subject can be obtained from the United States Department of Agriculture. L.M.B.

Consult Marshall's *The Mushroom Book;* McIlvaine and Macadam's *One Thousand American Fungi;* Farlow's *Edible and Poisonous Mushrooms;* Peck's *Mushrooms and Their Uses;* Taylor's *Students' Handbook of Mushrooms of America;* United States Department of Agriculture Bulletin No. 175, *Mushrooms and Other Common Fungi;* Hard's *Mushrooms, Edible and Otherwise.*



MUSIC. "Music," wrote Carlyle, "is well said to be the speech of angels," and while that cannot pass as a definition, it does serve to emphasize the difference between music and any ordinary succession of sounds. In one sense music consists of any successions or combinations of sounds which are pleasant to the ear. That is, the "song" of a bird is music, and so are the tones of the Aeolian harp which the wind produces as it sweeps over the tightly-stretched strings. But in a stricter sense music is an art—the purest of the fine arts; and careful study is necessary for its mastery and its enjoyment.

Music among the Arts. Only as it avoids telling a story or teaching a lesson can any of the fine arts rightly lay claim to that name. Poetry may be didactic, that is, it may have as its main purpose the pointing of a moral, true and very beautiful, perhaps, but nevertheless a moral; a painting or a statue can tell a story; but music can do neither of these things. And since this is true, since it can but appeal to the sense of beauty and inspire pleasant sensation, it ranks as the purest of the arts.

In another way, too, it differs from all other arts save poetry, for all of these make use of materials which can be handled. The architect's dream is embodied in tier after tier of hewn stone; the sculptor's vision is made a solid thing in marble or bronze; that of the painter is worked out in pigments. But the musician has only tones to deal with. The poet, to be sure, works in words, but even his product differs from that of the composer, for when he has clothed his thoughts in the most beautiful words he can choose his poem can be enjoyed by anyone who is able to appreciate it, without the intervention of any other person. The composer's work, on the other hand, can be enjoyed only as the symbols which he has set down on paper are translated into sounds, for the most thorough musician cannot claim to derive real pleasure from merely gazing at the printed notes of any masterpiece, however perfect. In a way, this is a disadvantage to the composer. When a painter has finished a great picture, when a sculptor has put the last touch to his gleaming marble, he knows that as long as his masterpiece endures it will remain as he left it, interpreting his ideas. But the composer's work may well be distorted, for its performance must of necessity be left to others, and those others may be incapable either of grasping his meaning or of conveying it to others. In another way, however, this difference results in a distinct advantage, for while a statue, a painting, a triumphal arch can be in but one place at a time, a piece of music can be multiplied indefinitely, and can be heard in a hundred places at once.

The Place of Music in Life. "Music," someone has said, "is the fourth need of man: food, clothing, shelter—then music." At first hearing that may seem beyond the truth. "Nonsense," says the intensely practical man, "I have lived fifty years, have built up a fortune, and I don't suppose I've given six hours to music in all my

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life." But his attitude proves nothing. He has got along without music, but that is no evidence that he has not needed it, that his life would not have been far richer and better if its influence had been admitted.

> The man that hath no music in himself,
> Nor is not moved with concord of sweet sounds,
> Is fit for treason, stratagems and spoils,

wrote Shakespeare; and while it must be admitted that he exaggerated, and that many an excellent person has no love for music, it is nevertheless true that music should have a very real part in every life. The greater part of the time of most people is given up necessarily to material things—to the struggle for a comfortable livelihood, perhaps even to a grinding fight against poverty; and those elements are sadly needed which can inspire, which can lift the mind above sordid things and make clear the possibility of a larger life. And this inspiration, this pleasure, freed from all taint of worldliness, nothing can give more perfectly than good music. Addison wrote of music that

> It wakes the soul, and lifts it high,
> And wings it with sublime desires,
> And fits it to bespeak the Deity.

More than once in the history of the world music has been an important factor in some great movement. What the *Marseillaise* has meant to France everyone knows—how it has been necessary at times to forbid its use because it fired to such fury and bitterness the legions who sang it. The Greeks had a beautiful story, half legendary, perhaps, but worthy to be true, which well illustrates this point. At one time in the very early days of Greece, the Spartans, hard pressed by their enemies, sent to Athens seeking aid, but the Athenians were too jealous to grant their plea. Fearing to refuse outright, however, they resorted to a subterfuge; they sent as their representative the poet Tyrtaeus, a man of song and not of action, thinking that he could give no possible assistance. But how great was their error! For Tyrtaeus composed ringing martial songs, and under the inspiration of these the Spartans renewed their courage and gained a glorious victory.

The Study of Music. There is a word which has been misused and overworked until it has come to be held in contempt—the word *culture;* and yet that for which it stands, if genuine and not self-conscious, is by all means to be sought. And no one can hope to have a true culture and a broad education without a knowledge of music. At once, when such a statement is made, two objections arise. In the first place, some critic will say it is necessary only to *enjoy* music, not to be able to *produce* it; and anyone with ears can do that. But this is not really true. It is true, of course, that almost everyone receives some pleasurable sensation from listening to music, but only the trained hearer can feel a true appreciation and derive the maximum of pleasure. The person who has absolutely no musical knowledge can no more hear all that there is to be heard in a great musical composition than the child who has read no further than "I see the cat" in the primer can appreciate Shelley's *Ode to a Skylark.* Such a child may, if he has an inborn sense of rhythm, feel just a hint of the charm of flowing lines, but that is very different from an understanding of the poem.

The second objection is that everyone cannot become a musician. This is true, if by musician is meant a singer, a performer upon some instrument, or a composer; and for too long music was held to be just an elegant accomplishment, reserved for those who had a special bent for it. But times have changed, and some musical training has been made a part of general education; it has come to be understood that everyone can be at least an intelligent listener, if not a performer. As well say that, because a child will probably never write poetry, or give public readings, it is not necessary for him to be acquainted with any poetry, as to declare that the person who is not to become a professional musician need not be taught music.

There is more than one type of musical training. There is drill in the rudiments of the science, in the terminology, the notation, the actual production of tones; for it is a fact which admits of no contradiction that everyone, whether he ever makes practical use of his knowledge or not, can learn to "read music" readily. Then there is that more theoretical study which concerns itself with the hearing of music rather than with the production; for it cannot be too often stated that listening to music requires a special training. When one looks at a statue or reads a poem, the composition remains fixed before the eye. Attention may be directed first to one part, then to another, and then in the end the whole may be subjected to a long examination. But in music conditions are otherwise. Everything is fluid. A certain melodious strain, an exquisite chord,

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has passed almost before the ear has caught it, and the performer cannot well be stopped and asked to repeat it. It is necessary, therefore, that the musical memory be trained, so that one part may be retained in the mind until what follows has been welded to it, and the perfect form is grasped. Some knowledge of various musical forms is necessary, too, that the hearer may know what to expect when listening to a certain composition. In this latter phase of study these volumes will be of assistance, for they discuss without technical difficulties the musical forms—the sonata, the fugue, the concerto, the symphony, and others; while as for the actual drill in rudiments, there is given below a complete, if brief, course of study. Before this is taken up, however, some knowledge of the history of music is most desirable, as without that its purposes and its achievements cannot be understood.

The Story of Music

In the Long Ago. Practically every tribe, no matter how primitive, has its music of one form or another, though to civilized ears it may sound very unmusical; and in the far-away ages of the world every nation produced music of some kind. But there were very decided differences between even the best of this ancient music and what modern people know as music. In the first place, the ancients had no harmony; they knew nothing of the exquisite effect to be gained by sounding together two or more notes that "chord," and produced only melodies or "tunes" of the very simplest sort. Then, too, they knew nothing about key—not even the facts which the youngest beginner learns to-day.

Little is known of the music of the Egyptians, beyond the fact that on their rude sculptures various instruments are shown, but it is of importance because from it the music of the Greeks was derived; and the Greeks, masters of beauty in almost every stage, made decided advances in music. To them, however, it was not really an art in itself, but a means of heightening the effect of poetry. When a poet had produced a number of beautiful lyrics or perhaps such a wonderful epic as the *Iliad,* he could not have them published as can a modern writer, but with his lyre or cithara he appeared before some great assemblage and chanted his sounding lines; and if his hearers were pleased with him he was crowned with a wreath of laurel. Many were the legends which the Greeks wove about music, and the very name is taken from that of the Muses, the goddesses who presided over its mysteries. Apollo was the god of music, and the lyre was sacred to him; any presumptuous mortal who dared to challenge his powers was most severely punished (see APOLLO).

The Romans borrowed their music from the Greeks, but found it not warlike enough to suit their martial spirits. They introduced the trumpet and the tuba, and the all-conquering legions responded to the different notes of the trumpet as does the modern army to the bugle calls. It is also said that the first organ, a crude affair, was invented by the Romans.

Sacred Music. Meantime, far to the East, across the sea from Greece and Rome, had grown up music of a different sort. This consisted of the sacred songs of the Hebrews, of which the words, but no hint of the music, came down to later times as the *Psalms.* When Christianity spread to the Roman Empire and became in time the accepted religion, the old psalms were used, and new songs and chants were introduced. Indeed, for several centuries the art of music was preserved by the Church alone. Nobody can tell to-day what sort of "tunes" these early Christians used for their songs, but they probably had little connection with the old Roman and Greek music. In the sixth century there lived a pope, Gregory the Great, who did much to advance music, writing hymns, and above all else producing the Gregorian chant which is to this day used in the Roman Catholic Church.

Still there was no such thing as harmony, the chants all being sung in unison; nor had the staff or a satisfactory system of notation been invented. And until these fundamentals had been agreed upon there could be no real progress. The seventh, eighth and ninth centuries passed with little change, but at the close of the ninth century a monk of Flanders wrote a treatise in which he set forth many of the principles of harmony, and about a century later the staff, almost as it exists to-day, was invented.

Folk Songs. The solemn chants did not completely satisfy that love for music which seems inborn in human nature, and in every country folk songs grew up. The Celts made decided progress in such music, and their bards, who sang or chanted to their rude, stringed instru-

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ments ballads of their own composition, occupied an enviable social position. Later came the minstrels and the troubadours, with their ballads and their love songs, into which there crept during the time of the Crusades new musical forms brought from the Orient.

To-day the complaint is sometimes heard that sacred music has been lowered by a too close similarity to the undignified popular music of the time, but this is not the first age in which the Church has accepted suggestions from secular music. Far back in medieval times a writer of a mass would frequently take as his theme the air of some popular song, and references are found to masses which bear the far-from-sacred titles of *The Red Noses, The Armed Man,* or *Farewell, My Lover.*

Growth toward Modernism. In the fourteenth and fifteenth centuries the Dutch were the foremost musicians of Europe, paying especial attention to counterpoint—the arrangement of one or several independent parts, or voices, in harmony with a given melody. It was a Dutchman who made popular the madrigal, that during the sixteenth and early seventeenth centuries swept over Europe. The madrigal was a love-lyric written for from three to eight voices, in counterpoint, and usually unaccompanied. Every composer wrote madrigals, every singer sang them; and it is said that sight reading was a more widespread accomplishment among the educated than it is to-day, for a great invention had made possible the spread of published music—the application of movable type to music-printing.

Meanwhile Italy had produced the first great musical genius—the "father of modern music," Palestrina. It is almost impossible to overestimate his influence on the progress of the art, so thorough was his knowledge of all its principles, so elevated were his compositions. Even he, however, knew nothing of our very common phase of modern music—the writing of accompaniments, properly so called. To be sure, there were musical instruments in plenty, the organ, the clavichord, the spinet, the violin, the flute and the guitar; but when these were used with the voice they played just the notes which were sung—not an independent accompaniment.

The first opera which has a real claim to that title, though it by no means meets all the demands of modern opera composition, was written by Peri, and was produced at Florence in 1600. The same year saw the first oratorio, and both types of composition made steady and rapid advance. Indeed, by the eighteenth century most of the essential elements were present, and music bade fair to become the very popular art it has been since that time. The principles of harmony were well understood, and "part" music had been freed from the harshness which distinguished its earlier phases; a satisfactory notation had been universally accepted; instruments were plenty and were gradually being brought to greater perfection; and, best of all, the popular imagination had been touched and a boundless enthusiasm created.

The Modern Period. Since the eighteenth century each country of note has had its own musical history, differing as distinctly as has the political history. And yet no country could have progressed as it has done if it had failed to take advantage of the advance made in other countries. Throughout much of the modern period Germany has maintained a supremacy in the musical world, and a list of its great composers constitutes a veritable history of music. What, for instance, would the story of music be without the names of Bach, Handel, Haydn, Gluck or Mozart; without that supreme master, Beethoven; or, in the later period, without Schumann, Schubert, Mendelssohn, Liszt, Wagner and Brahms? In every field of musical endeavor German composers left their mark, instrumental music of every sort, song, opera, oratorio, all being enriched by them. Strength, dignity, emotional depth—these are the chief characteristics of the German school.

Italy's chief contributions have been to opera, and sweetness and beauty of melody have been the aim of most of its composers. Some of the most exquisite and well-known melodies in the world are from the operas of Rossini, Donizetti, Bellini, Verdi and Mascagni. Of more modern Italian composers the best known are perhaps Puccini and Wolf-Ferrari. France, too, found its chief musical joy in the opera, and the names of Cherubini, Auber, Halevy, Gounod, Bizet, Massenet and Saint-Saëns stand high in the list of composers. These are the three chief musical countries, but that does not mean that other nations have made no important contributions to the art. England, while it has produced nothing of note in the field of grand opera, has excellent dramatic music of a lighter character, as the names of Balfe, Barnett, Macfarren and Sullivan testify; while eminent composers in other fields have been Bennett, Barnby, Stainer,

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Coleridge-Taylor and Elgar. Poland has produced the great Chopin; Russia, Tschaikowsky, Rubinstein and Rachmaninov; Bohemia, Smetana and Dvorak; and Scandinavia, Gade, Grieg and Sinding.

North America had until comparatively recent times no independent musical history, and the work of its early composers, among whom John Howard Paine is perhaps best known, showed no originality. Later attempts were made to develop in the United States a national music by making use of negro folk songs or Indian chants as basic themes, but it cannot be said that the resultant music is characteristically American, for neither the negroes nor the Indians are typical of American life to-day. Chadwick, Nevin, Foote, Shelley, Cadman, Parker—these are some of the most important names in the history of music in America; but the name which far outshines them all is that of MacDowell, a composer of world fame, who died before he came to the zenith of his powers.

For a detailed account of the contributions which all of these composers in the various countries have made to music, see the articles on their names.

The most recent tendency in music, as in painting, has been toward impressionism, and the adoption of this tendency by composers everywhere has done much to obliterate national lines in music.

A Course of Lessons

The lessons which follow will not teach anyone to play the piano or to sing, but they are of such a general, basic character that they will form an excellent foundation for any other lessons. They intend to make clear the terminology and notation of music, and some of the simpler facts about musical theory; indeed, they cover just about the ground covered in a public school course in music, save that they make less provision for practice. Practice is necessary, however, and skill in recognizing the various symbols can be gained only from frequent sight of them. Any music book, even if it be but a hymn book, will furnish ample illustrative material to supplement the discussion here. For instance, when the various kinds of notes are treated, as whole notes, half notes, eighths and sixteenths, an excellent drill may be had by picking out each of these many times in some singing book.

Common Musical Terms. As music is the art or science of tones, it is necessary first of all to understand clearly what a tone is. All sounds are caused by the vibration of some body, and when this body is of a certain character and the vibrations are even and rapid enough to blend together into a pleasing and musical sound, this sound is known as a *tone*.

Experiment. Stretch a strong string or a fine wire between two nails about three feet apart, letting it remain rather slack. When it is plucked does a musical sound result? Draw it tighter and tighter, touching it occasionally. Can you notice just the moment when the sound loses its unmusical character and becomes a real tone?

Scientists have found out that if a sounding body makes fewer than sixteen, or more than 8,192 vibrations in a second, the human ear is incapable of receiving the result as a musical sound.

The musical sounds called tones differ from each other in four respects—in intensity, or loudness; in quality, or timbre; in pitch, and in length, or duration; and an understanding of these terms is necessary.

Intensity or loudness is a simple matter. Touch your tightly-stretched wire so that its vibrations are but small. Now pluck it hard, so that it may vibrate through a wide arc. Which operation produces the louder tone? This will show you that intensity, or loudness, has to do, not with the length of the vibrating body, but with the size of the vibrations, wide vibrations giving the louder tone. Now, no matter what the instrument used, whether it be the piano, the flute or the delicate voice of a child, loudness can be merely a relative matter, and composers and performers have agreed upon a number of terms which shall be used to indicate varying degrees of intensity. The following list gives the most common of these, with the ordinary abbreviation and the meaning of each. They are all Italian words, as are, in fact, most musical terms, and there is a certain justice in this, not only because modern music owed much of its early development to Italy, but because Italian is the most musical of tongues:

Fortissimo (ff.) .....very loud
Forte (f.) .....loud
Mezzo (m.) .....medium
Piano (p.) .....soft
Pianissimo (pp.) .....very soft
Mezzo Forte (mf.).....medium loud
Mezzo Piano (mp.).....medium soft

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Crescendo (cres.) or < gradually becoming louder
Decrescendo (decres.) } or > gradually becoming softer
Diminuendo (dim.) }
Sforzando (sf.) .....suddenly loud

Quality, or *timbre,* is a very broad term, but its distinctions are very easily recognized. Anyone, for instance, hearing four sounds made by a piano, an organ, a violin and the human voice, could tell the difference immediately—that is, could distinguish the various timbres; for quality or timbre depends upon the kind of vibrating substance which gives forth the sound.

Pitch is a very important matter, and concerns the highness or lowness of a tone. Turning once more to the stretched wire, pluck it and listen carefully to the tone produced. Now drive a staple into the wooden background so that it crosses the wire about in the center, and rests upon it. Vibrate either half of the string. Is the resultant tone the same as that given out by the whole string? Is it higher or lower?

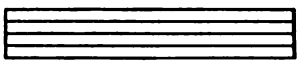
If your division of the string marks the exact center, the tone given out by the half will be in unison with that produced by the whole, but will be higher in pitch. The relations which govern the length of sounding bodies and the consequent differences in pitch have been worked out carefully, and it has been discovered that bisecting the vibrating string or air column doubles the number of vibrations produced, and raises the pitch exactly an *octave.* That is, if that fundamental tone known as middle C has 256 vibrations to the second, the C above will have 512, and that below 128. This entire question of pitch of octaves and the tones in between, is taken up in a later lesson on *Scale.*

Duration refers to the length of time a certain tone is sounded. The wire referred to may be struck and then touched instantly so that the tone ceases abruptly, or it may be allowed to vibrate until the tone dies out. In either case the tone is the same, but the duration is different. In the latter instance the intensity changes, too, as the vibrations become less and less wide; but there is and can be no variation in pitch.

One of the important points to remember from this early study is that a vibrating body of a given length can produce only one tone. Intensity may vary, duration may vary, but the pitch cannot change.

The subject of duration is discussed in a later lesson, under the heading *Time.*

A Lesson on the Staff. All that has gone before concerns itself practically with the theory of music, but the student comes very early in his study to certain definite symbols, for music has a notation all its own. First of all, he must learn about the *staff.* This consists of five horizontal lines, equidistant from each other, and looks like this:



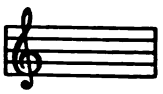
On it are written characters called *notes,* which represent the tones, and a tone is higher or lower according as its representative note is higher or lower on the staff.

Added Lines. Each line and each space of the staff is called a *degree,* but there are not enough of these degrees to allow for the placing of all the notes used in music, and it is frequently necessary to add, above and below the staff, short lines called *added* lines, or *leger* lines. These lines, of course, provide extra spaces as well, and these are spoken of as the *first space below,* the *second space above,* and so on, while the lines are referred to as the *first added line above,* and so on.

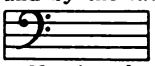
The Clefs. Now it is clear that it would be possible with the use of just one staff to place all the notes ever used, merely by adding an indefinite number of lines above and below; but this would be very confusing, as the added lines are not always easy to recognize. Therefore composers make use of two staffs, a treble staff and a bass staff, the latter indicating the lower notes. To distinguish between these two staffs, symbols known as *clefs* are used, and only as it is marked with one of these can a staff really indicate pitch.

The *treble clef* is also known as the *G* clef, for in its form it is derived from a capital G.

It is placed at the left-hand end of a staff, as here pictured, and by the fact that its end curls around the second line, it indicates that it is the treble clef, for *G* comes on that line.



The *bass* clef, or *F* clef, is made as shown, and by the fact that its head is on the fourth line, it shows that in the bass clef *F* is on the fourth line.



Naming the Staff Degrees. As stated above, two tones whose number of variations to the second stand in the ratio of one to two are an octave apart in pitch. In between these there are six other tones which, sounded one after

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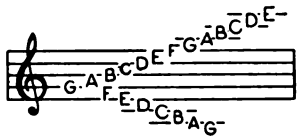
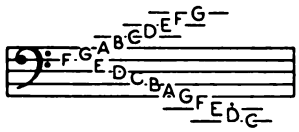
the other, seem to the modern ear to make up a more agreeable succession of sounds than any other, and these six, with the two "end" tones, make up the octave, for octave means *eight*. Each of the tones in this series of eight is given a name to indicate its pitch, these names being the first seven letters of the alphabet; for tones just an octave apart bear the same name. The staff on which notes must be written if they are to show pitch has its lines and spaces named according to the note for which it stands. The degrees of the treble staff, then, with the added lines and spaces most commonly used, are lettered as follows:



Whenever a treble staff is seen, the notes on it indicate just these tones and no others, unless there is placed at the left end of the staff or before any one note one of the symbols called *sharps* or *flats* (see below).

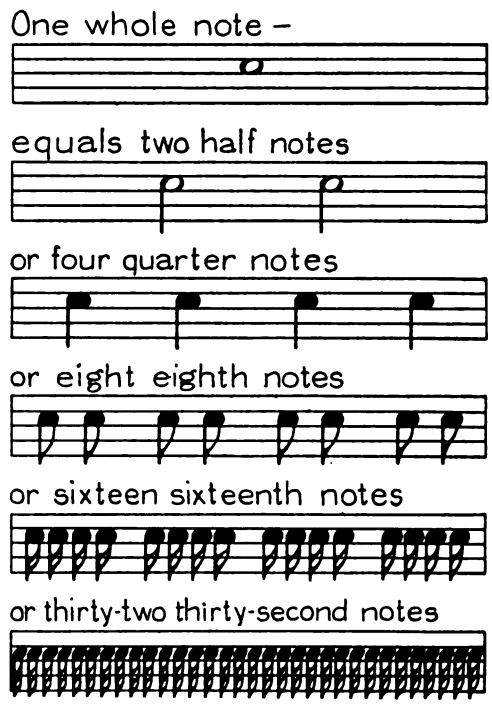
In the bass clef the degrees indicate the following letters or notes:



The added lines above on the bass clef and the added lines below on the treble overlap, that is, the first added line above the bass and the first added line below the treble both indicate middle *C*. This duplication, however, is not unnecessary, for it furnishes a method of showing clearly whether it is the left hand or the right hand which is to play the notes on the piano, and whether the basses and tenors or the sopranos and altos are to sing certain notes on the staff.

Instant recognition of every note on the staff is necessary before any headway can be made in the study of music, and such recognition can never come from reading about the notes. Only continued examination of the staff itself, and much practice in locating the notes on it, can make such foundation knowledge absolutely sure. First study carefully the treble staff and the bass staff given above. Then draw the two and place upon them the letters or names, taking care not to use the easy method of placing them in order as they come. Write the letter of the fourth space of the treble clef; the fourth line of the bass; the fifth line of the treble; the second line of the bass. Write *C* above the treble clef; *A* below; *E* above the bass clef; *A* on that clef. Continue this until all the lines and spaces are named, and repeat the exercise until you can fill in the letters as easily as you can write the alphabet or count from one to ten.

A Lesson on Notes and Rests. We have spoken of notes as indicating *pitch* by their position on the staff; but pitch is not all they can show. By their *form* they indicate the duration of the tone—the length of time it is to be continued. The standard is the *whole* note, and upon the time allowed for this depends the length of all the other notes. The following table will show the forms of the various notes, the names, and the part of a whole note to which each is equal:



Rests. Since time is such an important feature in music, the periods of silence must be as exactly timed as is the duration of notes, and thus there are necessary symbols called *rests* which indicate silence. Each kind of note has a rest corresponding to it, and the various rests have the same relation to the whole rest as do the various notes to the whole note. The table on the next page indicates the forms and names of the rests.

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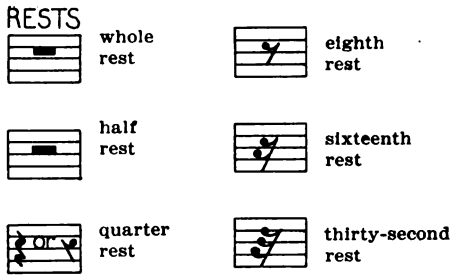
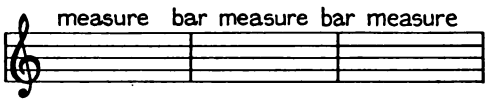


Measures and Time. Just as a poem is divided into lines of certain length, not that it may "look well on a page" but that the rhythm or meter in the mind of the poet may be apparent, so every musical composition is divided into equal portions of time, called *measures.* Nowadays poets frequently disdain the old division into rhythmic lines, and compose what they call "free verse," which has no regular metrical scheme, but no musician ever tries to write music without separating it into measures of equal length. When music is *heard,* it is the rhythm or accent which shows where the divisions come; when music is *written,* the measures are separated by vertical lines called *bars,* thus:



And just as a line of poetry is divided into *feet,* so a measure in music is divided again into equal portions of time called *beats.* A measure may have two beats, six beats, four beats, three beats, but unless there is some indication to the contrary, one measure must not have two beats and the next three or four. On looking at a piece of music it is not necessary to count the number of beats to a measure, for the composer has clearly indicated this. To the right of the clef sign at the beginning of the composition appears a fraction which is known as the *meter signature.* The numerator of the fraction tells how many beats there are to each measure; the denominator, what kind of a note is to receive one beat. Suppose, for instance, that the signature is 4/4, the so-called "common time" signature. It shows instantly that a measure contains the value of four quarter notes; or, in other words, that there are four beats to a measure, and that each beat belongs to a quarter note. The signature 6/8 indicates that an eighth note is the standard and receives one beat, while there are six such notes to a measure. Half notes, quarter notes and eighth notes are the ones most frequently used as standards, and the signatures most commonly used are 2/2, 2/4, 3/4, 4/4, 3/8 and 6/8.

Musical Accent. If every note in a measure received just the same stress, there would be no reason for dividing a composition into measures at all, but music has its accent just as do words. In each measure the first beat, the note just after the dividing bar, is accented, and the different meters correspond to certain meters in poetry. A 2/2 or a 2/4 meter, for instance, is like the trochee in poetry (which see), which consists of a strong syllable followed by a weak, while the 3/2, 3/4 and 3/8 measures are like the dactyl, with its "strong, weak, weak" movement.

In pronouncing a long word it is frequently necessary to use more than one accent, the "secondary" accent, as it is called, being not so heavy as the regular one; and music shows the same tendency. If a measure has two or three beats it has but one accent, as "*one,* two, *one,* two" or "*one,* two, three, *one,* two, three;" but in measures with four or six beats there is a secondary, weaker accent which falls on the beat immediately after the center, thus ONE, two, *three,* four" or "ONE, two, three, *four,* five, six." In case there are nine or twelve beats to a measure—for 9/8 and 12/8 time are not unknown—the first note in each group of three is stressed, but the main accent always falls on the first beat. For "ragtime," or syncopation, see subhead, page 4025.

Divided Beats and Broken Measures. It must not be imagined that just because a meter signature indicates that a certain note is the standard, only that kind of a note can be used in the composition. If the signature is 3/4, for instance, it is not necessary that quarter notes shall predominate. There may be half notes, which have the value of two quarter notes; there may be eighth notes, of which it takes two to equal a quarter note, or there may be sixteenth or thirty-second notes, but of course there cannot be a whole note, for that is equal to *four* quarters, and a 3/4 measure does not contain so many. It must be borne in mind that every measure must be complete —must contain just exactly the time value indicated in the signature. In the 3/4 meter a measure may contain a half note and a quarter or two quarter and two eighths, but not a half note and an eighth note. Figure out for yourself and mark down on a staff as many different note combinations as possible for a 3/4 measure; for a 4/4; for a 6/8.

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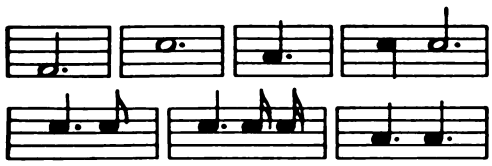
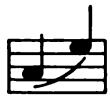
Sometimes there is introduced for variety what is known as a *triplet*. This, as its name indicates, is a group of three notes, but when they are played they have the value of only two notes of the same sort. Two eighth notes, for instance, are played or sung in the time of one quarter note, but these two eighths may be replaced by three, tied together as a triplet. The commonest way of writing a triplet of eighth notes is to join the stems, thus: , but a triplet of quarter notes is usually written thus: . A triplet is generally played rapidly and lightly, as though the word "hap-pi-ly" were spoken upon the beat when it occurs.

Perhaps someone may say, "But there *are* incomplete measures. I've seen pieces in 4/4 time whose first measure had but one quarter note." Turn to the end of the composition, however, and it will be evident that the difference is made up there. In a 4/4 meter, if the first measure has one beat, the last will have three.

The Important Dot. Suppose in writing a composition in 3/4 time the composer wishes to have one note held for a whole measure. How will he indicate that fact? He cannot simply write three quarter notes or one half note and two eighths, for each of these would have to be sounded separately. There are, however, two ways of showing exactly what he wants; he may either use the *tie* (see next subhead below) or the *dot*. The rule governing the dot is very simple: *a dot placed after any note adds one-half to its value.* A quarter note, for example, is equal to two eighths, and a dotted quarter is thus equal to three eighths, while a dotted half note equals three quarter notes. Bearing this in mind, can you add to the methods figured out above for writing a 3/4 measure?

Look carefully at the following and tell what meter signature in each case would have to be written in the measure:



Ties and Slurs. If two notes are written thus. . each one is sounded distinctly, but if they are connected with a curved line, thus, , only the first is sounded, but the time given it is equal to that of the two combined. That is, two quarter notes so connected would have the time value of a half note; a quarter note and an eighth note, the value of three eighth notes. Such a curved line is called a *tie*, and naturally it can be used only to connect notes on the same degree of the staff. Sometimes, however, an exactly similar line, as  , is used to connect notes on different degrees; this is called a *slur*. In instrumental music it tells the player to slip from one note to the other as smoothly as possible; in vocal music it shows that the notes joined are to be sung to the same syllable of the word.

What Is "Ragtime"? The regular rule for the accenting of measures is given above—the strong accent on the first beat. But sometimes, to give an unusual effect, the composer chooses to shift this accent to a beat that would commonly be unstressed. He therefore ties the first note in a measure to the last of the measure before, or ties the third beat in a 4/4 measure to the second, thus throwing the accent to the second or fourth beat. There are other ways of securing similar effects, but these are simple and illustrate the principle well. The musical name for such a shifting of accent is *syncopation,* and composers have always been disinclined to use it, while music students have considered it one of the subjects very difficult of mastery.

But of recent years there has been a real rage for syncopated music. Composers have flooded the market with it; people have learned to play it when they could not play anything else, and occasionally teachers have set themselves up as teachers of that only. It is not, however, commonly called syncopated music, but *ragtime;* for ragtime is nothing more nor less than music of fantastic meter, with its accents on other than the regular beats. Many critics and musicians deplore its wide spread, feeling that it is certain to result in a lowering of musical taste, but others believe that in time it will develop beyond its extreme state into a type of music that is really worth while.

Tempo. This word, which means *time,* is used to indicate the rate of speed to be used in singing or playing any composition. The absolute time can be given only by the metronome (which see), but the composer may use a number of terms which serve to show about how

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slowly or rapidly he wishes his compositions performed. The commonest of these terms are the following; like the terms indicating intensity, they are all Italian:

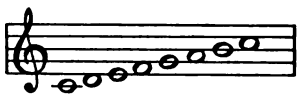
Adagio .....very slowly
Allegretto .....cheerfully
Allegro .....rapidly and brightly
Andante .....slowly and smoothly
Andantino .....somewhat slower than *Andante*
A tempo .....at the original speed
Larghetto .....slowly
Largo .....slowly and solemnly
Lento .....slowly
Moderato.....with moderation
Poco a poco....little by little, used in connection with some term meaning *more slowly* or *more rapidly*
Rallentando ...decreasing in speed and force
Retard .....slower and slower

A Lesson on the Major Scale. As stated above, there are in an octave eight tones, which make up a series more simple and pleasing to the ear than any other. This series is known as the *major scale,* and any beginning pupil, whether he be studying vocal or instrumental music, must devote considerable time to its complete mastery. First of all, it is necessary to realize that the major scale does not make use of *all* the tones between the extremes of the octave. Sometimes there is between two successive tones the interval of a half-step—the smallest interval in the scale; sometimes there is a whole step. In detail, the series is as follows:

Between one and two of the scale there is a step; between two and three a step; between three and four a half-step; between four and five a step; between five and six a step; between six and seven a step; and between seven and eight a half-step.

Thus to a certain extent the major scale is a fixed quantity, since it must always have the same order of steps and half-steps; but in another way it is not fixed, for it may begin anywhere within the range of tones. Sound any tone, and then one considerably lower. From either of these, or from any tone in between, the scale may start, but once its starting note is decided upon the series is exactly the same. This starting note has a special name. It is the *keynote,* or *key tone,* and it is well named, for all the scale depends upon it. Before writing any composition the composer decides on the tone with which he wishes his scale to begin, and indicates it on the staff, as will be shown below. Suppose he decides that *C* is to be his starting tone—then his composition is written in the *key of C.*

The So-called "Natural" Key. Choose some song that you know, and sing the first line of it. Then choose a new starting tone, somewhat lower, and sing the same line. You have sung the line in two different keys, and provided both were within the range of your voice, one was as easy as the other. But in learning to *read* music, whether vocal or instrumental, there is one key with which it is easier to begin than with any other, and that is the key of *C.* The pupil has learned to recognize the staff, the meaning of a bar, the letter-names of the different notes, the time value of the different kinds of notes, the clef signs and the time signature; and the key of *C* is the only key in which he can begin to read without having to learn other symbols at once. Moreover, in playing on the piano, this key is the only one which can be played without the use of the black keys. The key of *C,* or, as it is sometimes called, the scale *from C,* is written on the staff as follows:



Now refer back to the step-and-half-step description of the scale, and it will be evident that there must be a step between *C* and *D,* a step between *D* and *E,* a half-step between *E* and *F,* a step between *F* and *G,* between *G* and *A,* between *A* and *B,* and a half-step between *B* and *C.* If you will look at the piano and count upward from *C* you will find that the half-steps come where two white keys are together; the whole steps where there is a black key between.

The scale from *C* shows clearly one fact of general importance. Looking at the staff pictured above, name all the tones in the scale. Are there any of the seven letters used in naming the scale absent? In any other scale the same thing is true, only, of course, the start is made with a different note. Name in order the tones which make up the scale from *D;* the scale from *G.*

There is another common method of naming the tones of the scale—a method which is used for vocal music only. Each tone has a syllable, as follows:

One	Two	Three	Four	Five	Six	Seven	Eight
do	*re*	*mi*	*fa*	*sol*	*la*	*ti*	*do*

But it must be kept clearly in mind that these syllable names are related to the *tones,* in their numerical order, but not to the letter names. That is, the first tone in the scale is always *do,*

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just as it is always *one,* while the letter name varies according to the keynote of the scale. Thus in the key of *C, C* is *do;* in the key of *B, B* is *do,* and so on.

Working Out Other Scales. If the student approaches the subject with the right mental attitude, there is no topic in music more interesting than that of the changing scales. Sharps and flats then appear, not as vexatious signs invented to puzzle the learner, but as ingenious devices to do away with difficulties. The matter may be approached somewhat as follows:

Remembering that each scale must contain *all* the letter names, write the scale from *F,* and indicate underneath the interval between the successive tones, as made clear in the paragraph on the "natural" key.

1	2	3	4	5	6	7	8
F	*G*	*A*	*B*	*C*	*D*	*E*	*F*
step	step	step	half-step	step	step	half-step	

Now compare this with the order of steps and half-steps necessary for the making of a perfect scale. It is found there that the half-steps must come between three and four, and between seven and eight. So far as the latter is concerned, this scale from *F* is all right, for the interval between *E* and *F* is but a half-step. But the other half-step comes between four and five, instead of between three and four, as it should. What is to be done? There is no extra letter which can be used, but there is a handy little symbol which just answers the purpose. It is made thus, ♭, and is called a *flat,* and it shows that a tone one-half step lower than that indicated by the letter to which it is joined should be used. This flat, then, is placed in front of the *B,* and the interval between three and four is diminished to a half-step, while at the same time that between four and five is increased to a whole step. The scale from *F,* then, to be complete, should be written as follows:

F G A ♭B C D E F

Another scale which can be worked out without much modification is that from *G:*

G	*A*	*B*	*C*	*D*	*E*	*F*	*G*
step	step	half-step	step	step	half-step	step	

Here the first five intervals are correct, a half-step occurring between the third and fourth, but the other half-step appears between six and seven, instead of between seven and eight, as it should. The problem, then, is to lengthen the interval between six and seven and to lessen that between seven and eight, and that can be done in just one way—by substituting for *F* a tone one-half step higher. This new tone is called *F sharp,* and written ♯*F*. The scale from G, then runs

G A B C D E ♯F G

These two little characters, ♯ and ♭, serve to make all the changes that are necessary in working out all the possible scales, but whereas in the scales just discussed each one is used but once, in some scales there are several.

Interesting Problems. A scale may be written as stated above, beginning with any tone, and the beginner will find it interesting to work out other scales. He will thus convince himself that there is nothing more difficult about the scales with several sharps and flats than there is about the scale from *C*. Take, for example, the key of *A,* and write out the letters as follows:

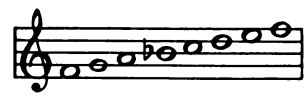
A	*B*	*C*	*D*	*E*	*F*	*G*	*A*
step	half-step	step	step	half-step	step	step	

It is evident at once that the intervals between two and three and between five and six must be lengthened, while those between three and four and between seven and eight must be shortened. By adding sharps to the *C,* the *G* and the *F,* this is accomplished, the resulting scale reading as follows:

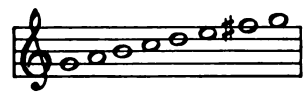
A	*B*	♯*C*	*D*	*E*	♯*F*	♯*G*	*A*
step	step	half-step	step	step	step	half-step	

Work out the scale from *E;* from *D;* from *B;* from ♭*E;* from ♭*B*.

When the principles of this are fully grasped, try writing out the various scales on the staff, placing the sharps or flats before the notes whenever necessary. The key of *F,* for instance, would be as follows:



the key of G would be written thus:



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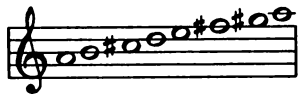
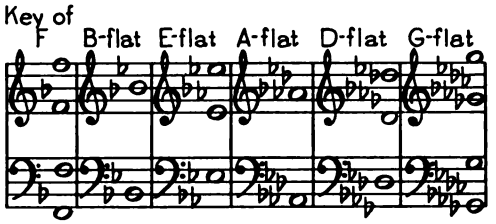
and the key of *A*,



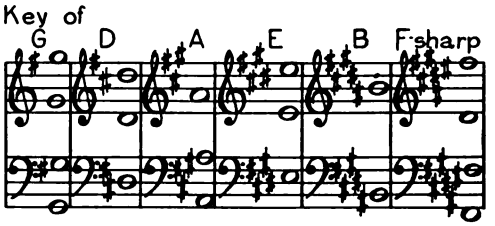
How to Remember Scales. Of course it would be possible in writing out a musical composition to place a sharp or a flat before each note when one was necessary, but this would be troublesome and would make the music look unnecessarily difficult. A much simpler method, therefore, is in use. All the sharps or flats needed for the scale in which a composition is written are placed at the left end of the staff, just after the clef sign, and every note which appears on one of these sharped or flatted degrees is affected throughout the composition unless otherwise marked.

The term *key signature* is the name applied to this group of key-marking sharps or flats; and every composition bears a signature, unless it is in the key of *C*.

Here are the key signatures for the scales which make use of flats. Both the bass and treble clefs are given, as the eye must learn to recognize one as rapidly as the other.



The sharp signatures run thus:



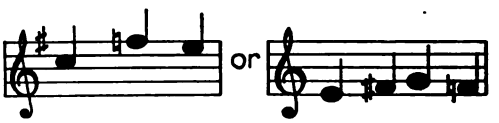
Is there any way to recognize a key from its key signature? is a question the beginner will want to know. It is easy enough to say, "This is written in the key of four flats," but what is the keynote, or *do?* Look in the flat signatures at the flat farthest to the right in each case, and count down four degrees on the staff, including the degree marked by the flat. Is the result not in every case the keynote, as shown above? That is, the flat farthest to the right always comes on *fa* of the scale, and it is merely necessary to count down, *fa, mi, re, do,* to find the keynote. In all except the key of one flat there is another method of recognition. The next to the last flat always marks the keynote.

To tell the keynote in a scale using sharps is even simpler, for the sharp farthest to the right is always just one degree below the keynote. In other words, this last sharp marks *ti* of the scale, and counting up one tone gives *do*.

In the formation of scales, flats are added in the order *B, E, A, D, G, C,* and sharps in the order *F, C, G, D, A, E*.

Accidentals. Sometimes the composer wishes to indicate that a note within the composition which was not indicated in the key signature is to be sharped or flatted, and he places a ♯ or a ♭ on the required degree of the staff. When the character is introduced in this way, it is called an *accidental,* and affects the note only through the measure in which it occurs.

There is another accidental which is made thus, ♮, and is called a *natural.* It cancels the effect of a sharp or flat, whether this has been used in the key signature or merely as an accidental. This will indicate its use:



A Lesson on Transposition. This may at first sound difficult, but there are certain facts about the subject of transposition which any pupil will find interesting. Transposition means the shifting from one key to another, and it is accomplished in a delightfully simple and orderly manner. Write out the letter names of the tones in the scale from C, thus:

C D E F G A B C

and to find the key of one sharp, take the fifth tone in the scale, or *G,* as the starting point. Writing out the formula,

G A B C D E F G

it becomes clear that *F,* or the seventh of the scale, must be sharped if it is to conform to the laws studied above. Now with this scale as a starting point, it is easy to find the key of two sharps. In the formula *G A B C D E F G,* take the fifth tone, or *D,* as a keynote, and complete the octave, and it will again be evident that the seventh tone must be sharped.

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This leads one to suspect a general law, and indeed, there is such a law, which may be stated thus:

The keynote in any scale with a sharp signature is the fifth tone in the scale with one less sharp. It makes use of just the same tones, but in addition sharps the seventh tone, or *ti*, of the new scale. This process is called *transposing by fifths.*

Keys with flat signatures, on the other hand, are *transposed by fourths.* Begin, as above, by writing out the scale from *C: C D E F G A B C.* Beginning with the fourth tone, or *F*, you will find that to keep the order of steps and half-steps correct in the new scale, the fourth tone, or *B*, must be changed to *B-flat.* This new scale, then, runs:

F G A ♭B C D E F

and its fourth tone is *♭B*, which becomes the keynote for the next scale in the ascending order of flat scales. To carry out the correct arrangement, it will again be found necessary to flat the fourth tone, or *E;* for transposing in fourths consists in taking the fourth tone of one scale as the keynote of that containing one more flat, and in flatting the fourth tone in the new scale.

A little practice will make all this very clear. Write out the scale of three flats, and from it work out the scale of four flats; of five flats. With the scale of two sharps as a starting point, work out the scale from *A;* from *E;* from *B.*

A Lesson on the Chromatic Scale. The major scale, discussed in the paragraphs above, is made up of eight tones, but within the octave there are other tones which are not included in the major scale. Altogether, there are twelve tones between a keynote and its octave, the intervals between them being in every instance half-steps. A scale which includes all these twelve tones is known as a *chromatic scale,* and since there are no tone names except the seven alphabet letters, a number of sharps and flats are necessary in writing any chromatic scale. Like the major scale, the chromatic may begin on any tone.

As you have done so often in other exercises, write out the letter names for the key of *C,* and describe the intervals.

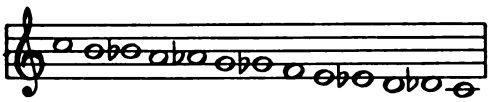
C	*D*	*E*	*F*	*G*	*A*	*B*	*C*
	step	step	half-step	step	step	step	half-step

Since in the chromatic scale no interval is more than a half-step, it is evident that there must be new tones introduced between *C* and *D, D* and *E, F* and *G, G* and *A,* and *A* and *B,* and the chromatic scale from *C* will thus run:

C ♯C D ♯D E F ♯F G ♯G A ♯A B C

and on the staff will be written thus:

In an ordinary major scale, when sharps are used in the ascending scale, they are used also in the descending, but in the chromatic scale sharps are used in the ascending and flats in the descending scale. The descending scale from *C,* therefore, is as follows:



To summarize, in the ascending scale, one-sharp, two-sharp, four-sharp, five-sharp and six-sharp are added to the regular tones of the major scale, while in the descending the added tones are seven-flat, six-flat, five-flat, three-flat and two-flat.

With this in mind, write out the letter names and the staff notation from the ascending and the descending forms of the chromatic scale in the key of *F;* of *G;* of *D.*

The Syllable-Names. Every child in school learns to sing the major scale by the *do, re, mi* method, and these syllable-names have been modified so that they fit the chromatic scale with its half-steps as well. Ascending, the syllables are as follows, those in small capitals showing the added ones: *do,* DI, *re,* RI, *mi, fa,* FI, *sol,* SI, *la,* LI, *ti, do;* and descending, *do, ti,* TE, *la,* LE, *sol,* SE, *fa, mi,* ME, *re,* RA, *do.*

A Lesson on the Minor Scale. Even a person who does not readily know what a *minor* is can usually recognize a composition which is played or sung in a minor key, for it has a peculiar mournfulness. So universally is this felt that the word *minor* has come into common literary use to describe just such a state or condition. "Her life had been from first to last in a minor key," writes the story-teller, and the reader knows at once that the heroine has experienced more gloom than brightness.

Each major key has a minor key corresponding to it, and the same key signature serves for both; but the minor key has as its starting note the sixth tone in the related major scale. In the scale from *C,* for instance, the sixth tone falls on *A,* and the key of *C* therefore has as its

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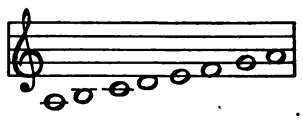
related minor the scale of *A-minor*. In the same way, the scale from *G* has as its corresponding minor the minor scale from *E;* the key of *F* has the key of *D-minor,* and so on. It is necessary always to use the word *minor,* for when the word *key* or *scale* is used without modification it is the major which is meant.

Things to Remember. Most important is the fact stated above, that the minor scale begins on the sixth tone of the major, or, in the syllable-language, on *la.* It must be borne in mind, however, that this related minor is in no sense a part of the major scale, but is complete in itself.

Then there must not be confusion of the numbers and the syllable tones. In the major scale *do* is the first and *la* the sixth tone; in the minor *la* is the first and *do* the third. The keynote of a minor composition, therefore, is never *do,* but *la.*

The order of steps and half-steps is also different in the minor scale. It has been well impressed upon us that in the major scale the half-steps are between three and four and between seven and eight, but in the minor scale there is no such uniformity, for there are three different methods of writing minor scales.

1. One form is the so-called *natural* scale, which uses only the tones of the major scale, introducing no extra sharps or flats. Such a scale in the key of *A-minor* would be written on the staff thus,

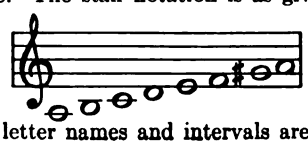


and its letters and intervals would run as follows:

A	*B*	*C*	*D*	*E*	*F*	*G*	*A*
step	half-step	step	step	half-step	step	step	

that is, the half-steps would occur between two and three and between five and six.

2. The second form is called the *harmonic* minor. It introduces one sharp, not as a key signature but as an accidental, thereby raising the seventh tone a half-step. As in the natural minor, the ascending and descending scales are the same. The staff notation is as given here,

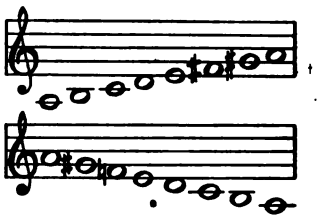


and the letter names and intervals are—

A	*B*	*C*	*D*	*E*	*F*	♯*G*	*A*
step	half-step	step	step	half-step	one-half step	and half-step	

This harmonic minor introduces a step-and-a-half interval, which has not been met with in any scale formerly studied.

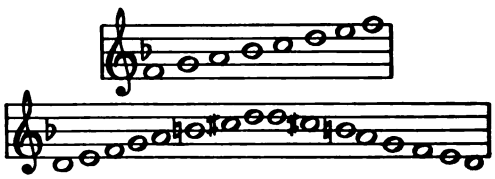
3. But the commonest form of the minor scale is the *melodic* minor, and it is this which is usually meant when the term minor is used. In the ascending scale it has the sixth and seventh tones raised a half-step by means of sharps, but in the descending for the sixth tone, and sometimes the seventh as well, is made natural. The melodic minor scale from A thus has its ascending and descending forms as follows:



Exercise. Practice writing out the major scales, each with its related minor, using the melodic form. Do this in two ways, with the letter names and with the staff, thus:

F-Major and D-Minor

Major: *F G A* ♭*B C D E F*
Minor (ascending): *D E F G A* ♮*B* ♯*C D*
Minor (descending): *D* ♯*C* ♮*B A G F E D*



It will be plain from the above example that the use of a sharp is not the only way of showing that a tone is to be raised a half-step. In the key of *F,* for instance, *B,* the fourth tone, is modified to *B-flat.* Now in the related minor key of *D,* this *B-flat* becomes the sixth tone, and must therefore be raised a half-step; and this is accomplished, not by adding a sharp, but by canceling the flat with a natural.

In a singing exercise the simplest minor scale to use is the so-called *natural.* Do not, however, confuse this with the natural key of *C,* for the natural form of a minor scale may have a number of sharps and flats. Remember that the term natural in this connection merely

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means that no sharps and flats not used in the corresponding major scale are added. Sing any major scale, using the syllables *do, re, mi, fa, sol, la, ti, do;* then sing down from lower *do* to *la,* and you will have the keynote of the corresponding minor scale. Sing from this *la* to *la* above, using the same syllables as in the major scale, *la, ti, do, re, mi, fa, sol, la.* This is the natural minor scale.

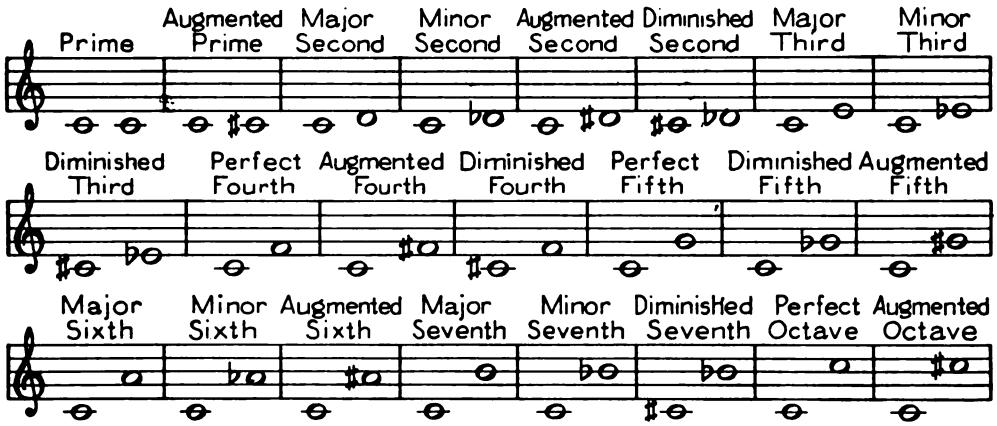
A Lesson on Harmony. As stated in the early paragraphs of this article, the ancients had no harmony—that is, they knew nothing of sounding two or more tones together. Even the very simplest "part" songs with soprano and alto were beyond their experience. But to-day, after the elements have been grasped, music concerns itself very largely with harmony. The piano pupil learns to "play with two hands;" the children in school sing in "part songs;" and the soloist sings to an accompaniment which very seldom reproduces just the notes which he is singing. To understand the rudiments of harmony it is necessary first of all to know something about intervals.

Intervals. The difference in pitch between any two tones, whether it be but a half-step or several steps, is called an *interval;* and each interval in the octave has its own specific name, according to the number of degrees it occupies. Thus the step from one of the scale to two is a second; from one to three or from three to five is a third; from one to five is a fifth, and so on. Even where sharps and flats are introduced, and an interval is then lengthened or shortened by a half-step, each interval has its name which exactly describes it. The above table gives these names in detail.

With this table before you, name the following intervals: *C* to *E; C* to *G; C* to *A; A* to *C; G* to *C; E* to *G; F* to *A; F* to ♭*B; D* to ♯*F; G* to *B; B* to *E; B* to *D.*

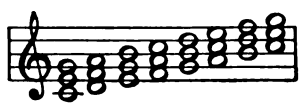
It is not necessary for the beginner to remember all these intervals in detail, for he will not make use of all of them. The simpler ones, however—the ones which contain just the tones in the major scale—should have attention. In the syllable scale, *do, re, mi, fa, sol, la, ti, do,* it is easy to name the common intervals, simply by counting. From *do* to *sol,* a fifth; from *do* to *ti,* a seventh; from *mi* to *sol,* a third; and so on. Practice the intervals, taking first the easier ones, the third, the fifth and the octave.

Chords. Two or more tones sounded at the same time constitute a *chord.* Thus every part song, no matter whether it has two, three or four parts, is made up of a series of chords.



The simplest chord for study is the one called a *triad,* which consists of three tones. These tones, however, must stand in a certain relation to each other.

Choose any tone in the scale, as *F,* and to it add its third and fifth, which are *A* and *C.* This chord of *FAC* is a triad, and a similar chord may be formed from any tone in the scale as a starting point, or *fundamental,* as it is called. Write out the letter names of the tones, using the whole series twice, thus: *C D E F G A B C D E F G A B C.* Now, using each of these tones as a fundamental, write a succession of triads by adding the third and fifth. You will have *CEG, DFA, EGB, FAC,* and so on. When you have done this draw a staff and represent your triads on it. It will appear as follows:



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If to the triad is added the octave of the fundamental tone, the resulting combination of four tones is known as a *full chord.*

A triad in music does not always appear with its fundamental tone lowest, for a rearrangement does not interfere with the harmony. The triad built on C, for instance, which is *CEG,* may be inverted so that it forms *EGC* or *GCE.* With your list of triads and those you have drawn on the staff before you, rearrange them all so that they shall appear in these three positions.

The discussion of other less simple chords and of other phases of harmony is too difficult for such a study as this, but most of the combinations found in the simple songs sung in school are covered by the description above.

This study has aimed to be suggestive rather than exhaustive, as was necessary within its narrow limits. If all the suggestions made are carried out, if every principle presented is made clear through sufficient practice, the elements of vocal music will be well covered. A.MC C.

Consult Surrette and Mason's *The Appreciation of Music.* For elementary lessons in vocal music apply for catalogue of schoolbook publishing houses.

Related Subjects. The reader is referred to the following articles in these volumes:

Aida
America
Annie Laurie
Auld Lang Syne
Band
Battle Hymn of the Republic
Cantata
Carmen
Carol
Cavalleria Rusticana
Chorus
Christmas, subhead *Christmas Carol*
Chromatic Scale
Conservatory
Gavotte
God Save the King
Hail Columbia
Harmony
Hymns, National
Hymns and Hymn Tunes
Intermezzo
Key
Lohengrin
Marseillaise
Metronome
Minstrel
Musical Instruments (with list)
Opera, subhead *Opera Bouffe*
Oratorio
Orchestra
Parsifal
Scale
Singing
Star-Spangled Banner
Te Deum
Tempo
Tone
Treble
Tuning Fork
Wacht Am Rhein, Die
Yankee Doodle

MUSICIANS

Abt, Franz
Bach, Johann Sebastian
Balfe, Michael W.
Beethoven, Ludwig von
Berlioz, Hector
Bizet, Georges
Bliss, Philip Paul
Brahms, Johannes
Buck, Dudley
Bülow, Hans Guido von
Calvé, Emma
Campanini, Cleofonte
Caruso, Enrico
Cavalieri, Lina
Chadwick, George W.
Chaminade, Cecile L. S.
Cherubini, Maria Luigi
Chopin, Frederic F.
Coleridge-Taylor, Samuel
Dalmores, Charles
Damrosch, subhead *Leopold Damrosch*
De Koven, Reginald
Destinn, Emmy
Donizetti, Gaetano
Dvorak, Antonin
Eames, Emma
Eddy, Clarence
Farrar, Geraldine
Flotow, Friedrich von
Foote, Arthur
Foster, Stephen Collins
Fremstad, Olive
Gadski, Johanna
Garcia
Garden, Mary
Gilmore, Patrick S.
Gluck, Alma
Gluck, Christoph W.
Gottschalk, Louis M.
Gounod, Charles F.
Grieg, Edvard Hagerup
Guido of Arezzo
Guilmant, Felix A.
Handel, George F.
Haydn, Josef
Heber, Reginald
Henschel, Georg
Herbert, Victor
Hofmann, Josef
Homer, Louise
Humperdinck, Engelbert
Joachim, Joseph
Kellogg, Clara Louise
Kubelik, Jan
Lind, Jenny
Liszt, Franz
McCormack, John
MacDowell, Edward A.
Mascagni, Pietro
Massenet, Jules É. F.
Melba, Nellie
Mendelssohn-Bartholdy Felix
Meyerbeer, Giacomo
Mozart, Johann Wolfgang
Muratore, Lucien
Nevin, Ethelbert
Nielsen, Alice
Nilsson, Christine
Nordica, Madame
Paderewski, Ignace Jan
Paganini, Niccolo
Palestrina, Giovanni da
Patti, Adelina M. C.
Powell, Maud
Puccini, Giacomo
Remenyi, Edouard
Reszke, Edouard and Jean de
Root, George F.
Rossini, Gioachino Antonio
Rubinstein, Anton G.
Ruffo, Titta
Saint-Saens, Charles C.
Schubert, Franz
Schumann, Robert
Schumann-Heink, Ernestine R.
Scotti, Antonio
Seidl, Anton
Sembrich, Marcella
Sinding, Christian
Smetana, Friedrich
Sousa, John Philip
Strauss, Johann
Strauss, Richard
Sullivan, Sir Arthur S.
Tetrazzini, Luisa
Thomas, Theodore
Tschaikowsky, Peter I.
Urso, Camilla
Verdi, Giuseppe
Wagner, Wilhelm Richard
Weber, Karl Maria von
Zeisler, Fannie

MUSICAL INSTRUMENTS. As musical knowledge has increased and interest in music has widened, more and more instruments have been fashioned for the production of musical effects. Each, however little it may differ from some other, has its peculiar properties, and there are few that the music lover would be willing to dispense with.

Related Subjects. The following instruments are given separate treatment in these volumes:

Accordion
Aeolian Harp
Bagpipe
Banjo
Bassoon
Bass Viol
Bugle
Clarinet
Concertina
Drum
Dulcimer
Fife
Flageolet
Flute
Guitar
Harmonica
Harp
Harpsichord
Horn
Jew's-Harp
Lute
Lyre
Mandolin
Oboe

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Ocarina	Trumpet
Organ	Viol
Piano	Violin
Piccolo	Violoncello
Saxophone	Xylophone
Tambourine	Zither
Trombone	

See, also, the article ORCHESTRA, for illustration of instruments used.

MUSK, an oily, strong-smelling substance obtained from the musk deer (which see). Because of its powerful and enduring odor it is used extensively in compounding perfumes. True musk is rare and has many commercial substitutes. An odor resembling musk is found in several animals and in a few species of plants, and artificial musk has been produced by a combination of chemical elements. The most valuable variety, called tong-king, is imported from China. The secretion is dried, reduced to a brownish powder, and exported in small lead- or tin-lined boxes. Musk is also used in medicine as a stimulant.

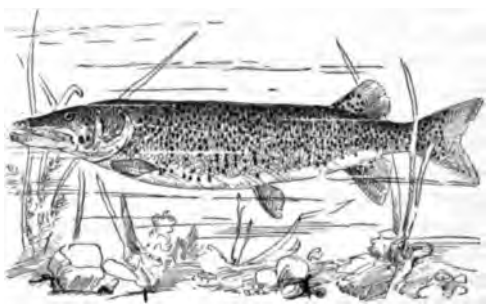
MUSK DEER, a small, clumsy deer found in the higher Himalayas, parts of Tibet and Siberia. It has no antlers; two large, tusklike teeth overhang the lower lip. Instead of ranging in herds, as does the ordinary deer, the little musk deer roams about alone and only at night; it is very timid and for that reason difficult to hunt. The musk deer is pursued for the tiny musk pouch found on the males, from which comes the musk that is used in perfumery and medicine. See MUSK.

MUSKEGON, MICH., the county seat of Muskegon County, is situated on the Lake Michigan shore of the state, at the mouth of Muskegon River. Grand Rapids is thirty-nine miles southeast, and Detroit is 196 miles distant, also southeast. Chicago is 189 miles southwest by rail and 110 miles by water. Transportation is provided by the Pere Marquette, the Grand Rapids & Indiana and Grand Trunk railroads, and an interurban line. Lake steamers connect with all important lake ports throughout the year, and there are daily sailings to Chicago. The population increased from 24,062 in 1910 to 26,100 (Federal estimate) in 1916; Scandinavians and Dutch comprise thirty-five per cent of the foreign born. The area exceeds six square miles.

Muskegon is the largest city on the eastern shore of Lake Michigan, and has the largest harbor on that shore. The construction of two dams in the river has greatly increased the industrial activities of the city; the leading manufactures are motors and billiard-room and office furniture, the factories employing about 5,000 people. Other products are paper, electric cranes, knit goods, boots and pianos; and these, with lumber, fruit, celery and farm products, comprise the chief articles of an extensive trade. Through the generosity of Charles H. Hackley the city has a fine art gallery, a public library, a gymnasium, a manual training school, an endowed hospital, a public square, a soldiers' monument and some handsome bronze statues; some of the city's institutions bear his name. The Federal building was erected in 1907 at a cost of $60,000. Large numbers of visitors are annually attracted to Muskegon for the charming scenery and the boating, fishing and bathing facilities of the vicinity. McGraft Park of forty-seven acres and Hackley Park are the city's recreation grounds.

Muskegon was settled in 1834, but a trading post was established here as early as 1812. The village was incorporated in 1861, and a city charter was granted in 1870. Before 1890 the city was noted as one of the largest lumber-producing cities in the world, but no mills are now in operation. P.P.S.

MUSKELLUNGE, *mus keh lunj* (accent first or third syllable), a magnificent game fish, the largest of its family, often reaching a length of eight feet and a weight of 100 pounds or more. Its general form is that of the common pike;



THE MUSKELLUNGE

in color it is dark-gray, having on its sides round, blackish spots of a varying size on a background of silvery-gray. The muskellunge is more commonly found in lakes Michigan and Erie, but is native to all the lakes of the Northern United States, to the upper Saint Lawrence River and to the lakes of Western Canada. It is considered one of the best food fishes, even equaling the black and striped bass. The usual method of capture is by trolling, in which a heavy hook, stout line and live bait are used; the fish is abundantly able to try the skill of the most expert angler.

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The state of New York has been propagating the species known as *Chautauqua muskellunge* for many years with notable success. It reaches a length of five feet, and is also called *salmon pike* or *white pickerel;* its white and delicate flesh is highly esteemed by good judges of food fish. See PIKE.

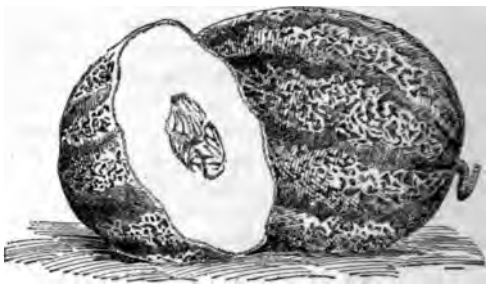
MUS'KET, the name of the weapon with which soldiers were armed previous to the introduction of the modern rifle. The musket used by the British army at the time of the Battle of Waterloo (1815) was affectionately referred to as "Brown Bess." While this was a great improvement over previous weapons, one man armed with a modern Springfield rifle would easily be a match for twenty with the musket of those days. The first muskets used in the sixteenth century were cumbersome weapons fired by a lighted torch or fuse, and too heavy to handle without a support.

Next came a musket fired by a wheel which, by friction, produced sparks from a piece of flint. This led to the old flintlock musket, which sometimes exploded, sometimes did not, by a spark from a piece of flint striking against a steel pan in which was placed a small quantity of powder. The introduction of central fire cartridges finally sounded the doom of the musket, which gave place to the rifle (which see). In addition, see SMALL ARMS.

MUSKHOGEAN, *mus ko ge'an,* the name of the chief tribe of North American Indians of the Creek confederacy, which includes the Creeks, Choctaws, Chickasaws, Seminoles and others. Formerly, they ranged all over the state of Mississippi, western Tennessee, eastern Kentucky, Alabama and Georgia, and later wandered through Florida. When the Spaniards landed on the Gulf coast in 1527 they found the Muskhogean living in fortressed villages, engaged in agriculture. They were much more intelligent and progressive than any other Eastern tribe of Indians. They had an elaborate social organization, each tribe living in a separate village. The remnants of the tribe now live on a reservation in Oklahoma. See INDIANS, AMERICAN.

MUSK'MELON, the sweet, luscious fruit of a vine belonging to the gourd family; the *musk* part of the name refers to its delicious, aromatic flavor. There are several more or less distinct botanical varieties, classified according to the shape, size and character of the fruits. They vary in size from a few inches to over a foot in diameter; some are oblong and others are nearly spherical in shape. The rind in these varieties shows differences in appearance and in degree of hardness, and the flesh is of various colors, including white, red, green, yellow and intermediate shades.

Muskmelons (sometimes incorrectly called *mushmelons*) are cultivated in warm climates all over the world. The greater portion of those raised for the American and Canadian markets are divided into two groups—*cantaloupes* and *nutmeg* melons. Strictly speaking,



AN "OSAGE" MELON

a cantaloupe is a muskmelon with a hard, scaly rind, which is often deeply furrowed. The name comes from that of a town near Rome (Cantalupo), whither the plant was first brought from its native home in Armenia. Nutmeg melons have softer, more or less netted rinds, and they ripen sooner than cantaloupes. However, the public does not readily distinguish between these varieties, and the name cantaloupe is applied without discrimination to both varieties.

These fruits require a warm soil and one in which their growth will be rapid. Six to ten seeds are planted, early in the spring, in hills four to six feet apart. If the soil is poor, manure fertilizer is used in each hill to hasten growth. In the north it is customary for commercial growers to start the plants in hothouses and to transfer them to the open field when warm weather arrives. Care should be taken to plant muskmelons some distance from squash, for the bees and winds sometimes spoil the flavor by mixing the pollen from the flowers of the different plants. The special enemies of the fruit are the striped beetle and the flea beetle, for they eat the leaves of the vine. These troublesome insects may be kept under control by spraying the leaves with Paris green or dusting them with tobacco dust or air-slaked lime. Applications of Bordeaux mixture will keep in check downy mildew and leaf-spot diseases, by which the plant is liable to be attacked.

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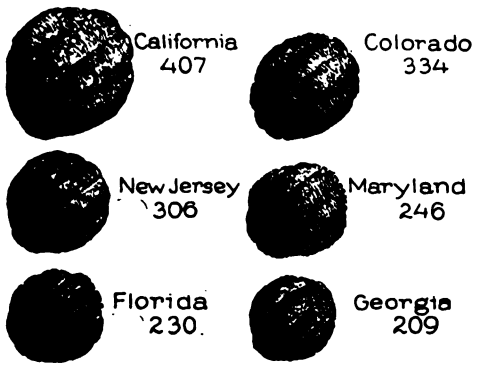
Food Value. Muskmelons have almost the same fuel and nutritive value as peaches, and they compare favorably with apples, pears and oranges as a table fruit. Their chemical composition is on the average as follows: water,



Figures Represent Thousands of Dollars

THE AVERAGE CROP

Including both muskmelons and cantaloupes, from six principal growing centers.

89.5 per cent; protein, 0.6; carbohydrates (starches and sugars), 9.3; ash, 0.6. They have a fuel value of 185 calories per pound (see CALORIE; FOOD, subhead *Chemistry of Foods*). Like other table fruits, their high water content makes them a valuable laxative food, and their agreeable taste and tempting appearance help to make eating them a delight, thus serving the appetite and the digestion. M.W.

MUSKOGEE, *mus ko' ge,* OKLA., the county seat of Muskogee County and a railroad center and distributing point of importance. It is situated at the head of navigation on the Arkansas River, forty-five miles from the eastern state line and about midway between the northern and southern state borders. McAlester is sixty-four miles southwest, and Kansas City is 250 miles north and east. Four railway lines serve the city—the Missouri, Kansas & Texas, the Missouri, Oklahoma & Gulf, the Midland Valley and the Saint Louis & San Francisco. Muskogee was settled in 1890 and was incorporated as a city in 1898; it adopted the commission form of government in 1910. The name is that of a Creek tribe of Indians, and is said to signify an *abundance of water.* An increase in population from 25,278 in 1910 to 44,218 (Federal estimate) in 1916 marks it a city of rapid growth. The area is eight and one-half square miles.

The surrounding country is rich in natural resources and well adapted to growing cotton, grain (especially wheat), fruits, vegetables and alfalfa, but cattle raising is the chief industry. The agricultural products named, with the manufactured products, hardware, implements and brooms, comprise the leading articles of commerce. The large machine shops of the Missouri, Oklahoma & Gulf Railroad are located here; the city also has cotton compresses, cotton gins and oil refineries. Oil and natural gas are found in abundance. In keeping with the city's recent growth are its public and business buildings, the most notable being the ten-story structures of the Severs Hotel and the Barnes office building, each costing $350,000; the Metropolitan, Phoenix, Surety, Flynn-Ames buildings and the courthouse, all constructed of reënforced concrete, and costing from $250,000 to $300,000 each. The Federal building, completed in 1915 at a cost of $750,000, is the largest government building in the southwest. An imposing high school building is also worthy of note. Muskogee has Saint Joseph's College, Bacone Indian University (Baptist), opened in 1884, the Oklahoma Woman's College, the Oklahoma State School for the Blind, the Spaulding Female Institute, a business college and a Carnegie Library. The city is the headquarters of a government Indian agent. Features of interest in the vicinity are Fort Gibson and a national cemetery. E.D.B.

MUSKOKA, *mus ko' kah,* **LAKES,** a chain of Canadian lakes, in the northwest part of the Ontario peninsula. They lie twenty to thirty miles east of Georgian Bay, and about midway between Toronto on the south and the main line of the Canadian Pacific Railway on the north. The Muskoka district, from the shores of Georgian Bay eastward, is one of the most famous pleasure grounds in America, and is visited each year by thousands of tourists and summer residents. It includes from 800 to 1,000 lakes, and comprises an area of 3,500 or 4,000 square miles. Most of the region is included in the so-called "highlands of Ontario," and has an average altitude of 200 feet above Lake Huron.

The characteristic ruggedness of the Laurentian Highlands is perhaps the chief scenic attraction. The hundreds of lakes and small streams are bordered by stately pines, giant hemlocks, fragrant balsams and wide-spreading maples. The shores are generally high and somewhat rocky; granite and gneiss are the predominating rocks. The total absence of limestone formations gives the waters of the region a special medicinal value, especially to persons whose blood pressure is very high. But

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Muskoka is not a resort for invalids; it is rather a playground. The month of August is the height of the social "season," but in June, July and September Muskoka is equally, if not more, attractive to the visitor who comes for an outing.

There are so many points of interest in Muskoka that it is possible to name only a few. The largest of the lakes is Muskoka, which has given its name to the section. It covers fifty-four square miles, and is twenty miles long and from two to eight miles broad. Rosseau and Joseph are smaller lakes near by. There are many fine waterfalls, notably the Bridal Veil Falls on the Shadow River, the High Falls and the South Falls (130 feet) on the Muskoka River, and Skelton Falls on the river of the same name. For the visitor who does not care to spend all his time in viewing the wonders of nature, there are golf, tennis, boating, bathing, fishing and other diversions. The Grand Trunk, the Canadian Pacific and the Canadian Atlantic make access to the region easy.

MUSK OX, a curious, long-haired, shaggy beast, between an ox and a sheep in appearance, with a musky odor which gives the species its name. It is about six feet in length, and the entire head and body are covered with dark brown hair, curly and matted on the shoulders, but hanging straight on the rest of the body. There is a patch of yellowish-white on the back, between the horns and below the knees, and the horns of the male are heavy, covering the forehead and curving downward. The musk ox was formerly found in the Arctic Sea regions in immense numbers, but is now common only in Arctic America, from Hudson Bay to the Mackenzie River and in Northern Greenland. These animals associate in herds, and their movements are described as very sheeplike. Their food consists of young willows, lichens and grass, and they are reported to breed only once in two years. Unlike the musk deer, the musk ox has no special gland for the secretion of musk. Its wool is spun into coarse fabrics, and its flesh forms an important item in the food supply of the Eskimos.

MUSK OX

MUSK'RAT, a large-sized member of the mouse family, sometimes called a "cousin of the beaver," because of its burrowing habits. It received its name from the strong, musklike odor of a fluid secreted in a large gland present in both sexes. The animal is about a foot long, and has a nearly hairless tail about eight inches in length. Its plump, thickset body is covered with an undercoat of thick, soft fur, and with an outer coat of long, shining hairs, dark brown above and gray below. The head is broad and rounded, the ears small and closely set, and there is no distinct neck. Like other aquatic animals, the muskrat has its hind toes webbed. It is distributed throughout North America from the Rio Grande to the Arctic seas, and from the Atlantic to the Pacific coast.

THE MUSKRAT

The muskrats dig their homes on the banks of streams and lakes. Their burrows consist of a central chamber with a number of passages, all opening beneath the surface of the water. They are agile swimmers and divers, and feed on the roots, stems and leaves of water plants and on fruits and vegetables found near their homes. They are hunted and trapped in the spring. Some are shot while swimming in the streams or resting on the banks; others are caught in steel traps which are placed beneath the water at their landing places. Their fur, which is dyed to imitate marten and mink, is used for making caps, gloves and coat linings, trappers receiving varying prices for skins, according to size. Muffs made of light-colored fur may be bought for $15; the more expensive sets, made of dark

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fur, cost about $100. When the long hair is removed and the silky underfur dyed, the latter is sold as Hudson seal.

MUSLIN, *muz'lin,* a fine cotton fabric, named after the city of Mosul in Mesopotamia, where it was first made. Muslin manufacture was introduced from India into Europe about the end of the seventeenth century, and is now extensively carried on in France, Great Britain and the United States. India and the other Eastern countries now make almost no muslin, and depend for their supply on the nations of Western Europe. Muslin is usually woven plain, similar to calico, but its texture is more like that of gauze. It is sometimes adorned with figured patterns, printed by the same processes as in calico printing, and is principally used for women's dresses, curtains and hangings.

MUSSEL, *mus''l,* from the Latin *musculus,* meaning *small fish,* is the name given two groups of hard-shelled animals, one found in the sea, and the other in fresh water. They belong to the division known as *mollusks* (which see), and have a soft, dark-colored body enclosed in a hinged shell consisting of a right and a left valve. The common sea mussel of the north temperate zone is used extensively as food by Europeans, and by American fishermen as bait. Farmers near the coast regions find it a valuable fertilizer. This mussel is usually about three inches long, though some of the largest specimens are twice that length. Its shell is black on the outside, pearly-blue within. By means of a tuft of long, silky filaments at one end of the shell the mussel anchors itself to rocks, sometimes remaining fixed for a lifetime. Fresh-water mussels are chiefly valued because they produce fresh-water pearls (see PEARL), sometimes worth as much as $25,000. For an important class of mussels see CLAM.

MUSSET, *mü seh',* ALFRED DE (1810-1857), a French poet, dramatist and novelist, born in Paris. His boyhood was passed among surroundings which developed his literary tendency, for his father was a man of letters, and other writers came often to the house. After his graduation, with honors, from college, he studied law for a time and then medicine, but found both professions distasteful and decided to devote himself entirely to literature. His first volume of poems, *Tales of Spain and Italy,* appeared when he was but twenty years old, and with the two volumes which followed, in 1831 and 1832, won him prominence in the world of letters. His next productions were dramas, some of which met with considerable success. Attempting as they do to combine the merits of the classic and the romantic schools, they are the most original dramatic works produced in his generation. The dialogue is particularly brilliant. Several of his novels, notably *The Confessions of a Child of the Age, Margot* and *Mimi Pinson,* are of special interest because they contain much autobiographic material. It is as a poet that Musset ranks highest, however, much of his work holding a place with the best poetry produced in France.

MUS'TARD, the common name of two species of the botanical family of the same name (see subhead below). These are the *black* and *white mustard;* they are annual plants, both in Europe and in America. In the United States black mustard appears as a weed, growing to a height of more than six feet in southern California, and forming hedges which it is impossible to penetrate. White mustard, although in all other ways resembling the ranker species very closely, seldom grows taller than two or three feet. The plant itself is dark green, with stiff, branching stems; it is covered with bristling hairs below, which disappear toward the top. From June to September it blooms with small, brilliant, yellow flowers. This plant has great commercial value. The pods, which are very small, and contain only one row of seeds, are gathered before fully ripe and allowed to ripen. When dry they burst open, and the seeds are then shaken out and ground. Mustard has no odor until water is added. The liquid preparation is given in small doses for the treatment of dyspepsia, and as an emetic; more commonly, mustard is used in making plasters. Commercial mustard, which is used for food flavoring, is usually much adulterated with flour.

BLACK MUSTARD

The Mustard Family, or **Cruciferae,** *kroo sif' er e,* has 1,800 species and is easily distin-

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guished. Plants of this family are very sharp to the taste, and have flowers in the shape of Greek crosses (from which the name *cruciferae,* which means *cross-bearing* in Latin, is derived). They also have pods which open below. Mustard, radishes, cabbages, cauliflowers and cress all belong to this family. The seeds contain an oil which is used as fuel in lamps and as a medium in oil painting.

Related Subjects. The reader is referred to the following articles in these volumes:

Annuals	Horse-Radish
Cabbage	Radish
Cauliflower	Turnip
Cress	

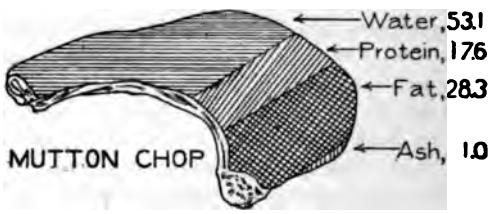
MUTSUHITO, *moot soo he' toh* (1852-1912), for over forty years emperor of Japan, was born in the mountains of Kyoto. The liberal education he received was superintended by his mother, and with her he lived quietly until 1868, when he was crowned at Osaka. The country was at this time torn by dissension and strife, following upon Commodore Perry's entrance into Japan and the treaty of 1854, whereby the country was opened to the Occident and concessions were granted to the foreigners. Japan was about to emerge from its twelfth century existence. To bring about peace and order, first of all, Mutsuhito aimed to get the government under his personal control; to this end he removed the capital from Kyoto to Yeddo, and called it Tokyo, or Eastern Capital.

Mutsuhito ascended the throne of a truly medieval country in a century of great enlightenment among other nations; in less than fifty years his son was crowned emperor of a great and powerful modern nation, a transformation due to the constructive ability of Japan's greatest ruler. Among the many foreign changes and reforms he introduced are the following: the establishment of deliberative assemblies, accompanied by the destruction of the last traces of feudalism, as the nobles voluntarily, one by one, guided by high motives of patriotism, surrendered their privileges; the adoption of the European calendar and European costumes in the court; the teaching of English in the schools; the adoption of a new judicial system, founded on the Code Napoleon, and the abolition of torture. These efforts to secure modern innovations were for a time violently resisted and three times led to internal rebellions, but Japan emerged from medievalism to a foremost position among the great modern nations within an incredibly short period.

Twice serious conflicts arose with China, first in 1874, over the possession of Formosa, and again in 1894, over the fortress Port Arthur. These troubles led the emperor to give much thought to the Japanese navy, resulting in the construction of a powerful fleet of warships. In the Russo-Japanese War Mutsuhito maintained close personal supervision of affairs, but the great success of the Japanese army was due to his trust in those whom he placed in charge. His generosity was marked, and he was greatly loved and respected by his subjects, for his human qualities as well as for his extraordinary powers of statesmanship. He was also a poet of distinction. His one son, Yoshihito (which see), succeeded him. See JAPAN, subtitle *History of Japan.*

Consult Longford's *The Evolution of New Japan.*

MUTTON, *mut''n,* sheep's flesh, a standard table meat which ranks with beef in digestibility, and has about seven-eighths of its nutritive value (see BEEF). Mutton of good quality is pinkish in color, close-grained and contains



FOOD VALUE OF A MUTTON CHOP
The fuel value of mutton is about 1475 calories per pound. It is practically equal to round steak.

a considerable amount of hard, white fat. Because of its pronounced flavor, the flesh of sheep is cooled and "ripened" before it is sent to the market. There is a standard method of dividing the carcass into "cuts," similar to that for beef (page 658). The meat of a young sheep is called lamb; tallow (which see) is made from the fat of the animal.

Australia, Argentina (South America), the United States and New Zealand are the principal sheep-raising countries, and all are important producers of mutton. European markets are supplied by Argentina, Australia and New Zealand, as the United States produces only enough for home consumption. Sheep carcasses are frozen hard in a refrigerating room before being shipped away, and in this way they arrive at their destination in good condition, even after a long journey. S.L.A.

MYCENAE, *mise'ne,* one of the most ancient cities of Greece, which flourished in

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the Heroic Age before the Trojan War. It was situated in the Peloponnesus on a hill above the Argive Plain, about six miles northeast of Argos. Excavations are continually going on at Mycenae, and the place seems to be an unlimited storehouse of ancient relics. It is supposed to have been the home of Agamemnon, and his traditional grave, as well as that of Cassandra, has been found there. Recent discoveries show that the people of Mycenae considered it also the home of Odysseus. The great wall of Mycenae has been standing since the founding of this ancient town, which was overthrown by the Argives in 463 B.C. See SCHLIEMANN, HEINRICH.

MYOPIA, *mi o' pi a,* a form of defective eyesight which is commonly known as *near sight* or *short sight.* The source of the trouble is that the eyeball is too long. As a result, rays of light are brought to a focus in front of the retina, instead of on it, and this causes the image to be blurred. (The reader will find a full discussion of the process of seeing in the article EYE, subhead *How We See.*) Nearsighted persons must wear glasses having concave lenses; that is, lenses thin in the middle and thick at the edges. Such lenses are the opposite of the eye in shape, and they bring the light rays to a focus on the retina, thus correcting the trouble. Some persons are born nearsighted, but in others the defect is developed by misuse of the eyes, such as doing close work for long periods without rest. Those who have defective eyesight should keep in constant touch with a competent oculist. The glasses should be changed as needed, and eyestrain should be guarded against. Neglected myopia may develop into blindness. See EYE, subhead *Care of the Eyes;* BLINDNESS. R.J.T.

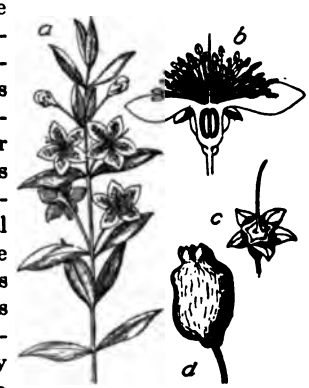
MYRIAPODA, *mir i ap' o da,* a group of long, slender, wormlike animals, represented by the centipedes, galleyworms and millipedes. Their class name, which means *having ten thousand feet,* refers to their numerous appendages, which serve as legs. They have a distinct head bearing one pair of antennae, or feelers (see ANTENNAE), and have simple or compound eyes; a few have no eyes. Their bodies are divided into numerous segments, seldom numbering less than twenty-four; on these are borne the hairlike appendages by which the animal moves forward. The higher forms have fewer legs than the lower, and these are jointed like those of insects, with which they were originally classed; they are now considered a distinct class of jointed animals (see ARTHROPODA). Myriapods are found in all parts of the earth, and mostly inhabit dark, damp places; they range in size from minute forms which are almost invisible to those having a length of six inches. The eggs of some species are numerous, from sixty to one hundred being deposited at one time. The claws of the centipede, which contain poison, are weapons of attack and defense. Other myriapods are defended by poison fangs and scalding fluids.

MYRRH, *mur,* a fragrant, gumlike substance which oozes from a species of shrub found growing in parts of Arabia and Eastern Africa. The plant itself has scanty foliage, small green flowers and oval fruits. The oil from the gum is used in medicines, incense and perfumery. There are many references to it in the Bible, but the one with which we are most familiar is found in *Matthew* II, 11:

> "They [the wise men] saw the young child with Mary, his mother, and . . . . presented unto him gifts; gold, and frankincense, and *myrrh.*"

England has preserved a pretty custom in connection with this sacred incident, for the subjects of the queen present her annually with these three gifts at the feast of Epiphany (which see), in the Chapel Royal in London.

MYRTLE, *mur' t'l,* a group of plants belonging to the myrtle family, the best-known representative of which is a beautiful evergreen shrub or tree which bears shining blue-green, long, oval leaves and white flowers. This plant, known as the common myrtle, is quaintly described in a poem by James Montgomery, a Scottish poet:



MYRTLE

(*a*) Branch, with flowers; (*b*) vertical section of flower; (*c*) calyx, torus and pistil; (*d*) fruit.

> Dark-green and gemmed with flowers of snow,
> With close uncrowded branches spread
> Not proudly high, nor meanly low,
> A graceful myrtle reared its head.

The common myrtle is native to the countries bordering on the Mediterranean Sea and to the temperate regions of Asia. The leaves, bark, flowers and berries are aromatic and are used in the manufacture of perfumery, while

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the bark is utilized in the tanning industry in several sections of Southern Europe. Among the ancient Greeks the myrtle, as a symbol of youth and beauty, was sacred to Venus and found a place frequently in the greatest of their festivals.

Among other species of myrtle are the small-leaved myrtle of Peru, which bears sweet red berries of a very pleasing flavor; and the guava of Chile, which grows as a tree and produces a hard, useful wood. In California various species are cultivated as ornamental outdoor shrubs.

MYSORE, *mi sohr',* a city of Southern India, capital of the native state of Mysore. It is picturesquely situated at the base of a hill whose summit, crowned with temples, rises nearly 3,500 feet above the sea. Though a town of ancient historic associations, for it was in existence three centuries before Christ, Mysore has many modern features and possesses several handsome public buildings. In the center of the city is an old fort containing the maharajah's palace. Other points of interest are the Maharajah's College, the law courts and the Victoria Jubilee Institute. The manufacture of carpets is a thriving and important industry. Population, 1911, 71,300.

MYSTERIES, *mis' ter iz.* In ancient Greece, and later also in Rome, solemn religious celebrations were held in honor of certain gods or goddesses, to which no one was admitted except those initiated and under the vow of secrecy. Violation of the vow meant death. This explains the name *mystery,* coming from the Greek word meaning *initiate.* Their purpose was not only to render worship, but to instruct the people in religious observances and by mystic dramas to preserve the traditions connected with the divinity. In some of the mysteries only a limited number of priests took part; others were participated in by many people.

The greatest of all the Greek mysteries were the *Eleusinian,* celebrated in honor of Demeter and her daughter Persephone. Others were the *Dionysian,* devoted to the worship of Dionysus, or Bacchus, in the nature of wild orgies, which later became so corrupt that they were prohibited; the *Samothracian,* celebrated in Samothrace, especially, in honor of the Cabeiri, or great gods; and the *Orphic,* connected with the cult of Dionysus and practiced by private sects claiming to possess secret knowledge of the means to win happiness after death.

Even to-day no one knows for a certainty the real meaning behind the different mysteries. Such knowledge as we possess of the rites has been gathered mainly from vases and inscriptions unearthed in excavating the ruins of ancient cities.

MYSTERY PLAY, one of the earliest of medieval dramas, usually a representation of scriptural scenes and incidents. Often, however, the name is used interchangeably with that of the miracle play, which was, strictly speaking, a dramatic spectacle founded on the lives of the saints. In its beginnings the mystery was little related to the older drama, for it grew up in the Church and was used by the clergy as a means of instruction and as a method of impressing the attendants on the services. Some special scene from the Bible would be chosen and presented by the clergy in the Church; thus, at Easter the resurrection might be rudely shown, at Christmas the journeying of the magi, the wondering shepherds and the worship of the Babe in the manger.

In the course of time, these plays became more and more dramatic and passed out of the hands of the clergy, usually to the various trade guilds. The streets or public squares were the scenes of the performances, which were given on movable stages. Sometimes very elaborate series were worked out, which included almost the whole Scripture narrative and required a number of days for their performance. Thus, certain cycles survive which consist of 32, 42 and 48 plays respectively.

The dates during which mystery plays were popular are not, of course, sharply defined. The earliest and crudest, perhaps, took place as early as the beginning of the eleventh century, while the last mystery of which there is positive record was performed in 1580, after the regular drama had obtained a firm foothold. The Passion Play, given every ten years at Oberammergau, is closely related to the old mystery plays.

MYSTICISM, *mis' ti siz'm,* a term which includes various ideas of worship, philosophy and religion. It attempts to define the tendency in human nature to seek soul satisfaction and supreme happiness in things spiritual, where the material fails to satisfy, and it endeavors to account for the exalted, ecstatic state of those far advanced in spiritual life, who feel at one with the Deity. The term is carelessly used as the opposite to rationalism, but mysticism is often coupled with great administrative power; some of the greatest men and women of all ages have been mystics. See RATIONALISM.

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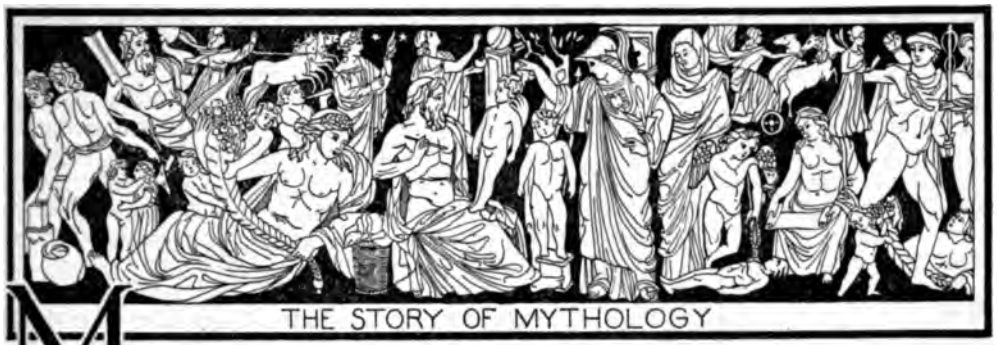

MYTHOLOGY, *mi thol' o ji.* Hundreds and hundreds of years ago, when the nations of the world were in their infancy, there were many questions for which people could find no answers. There were no works on astronomy to explain to them that the sunrise is not a real rising of the sun, but is caused by the turning of the earth on its axis; or that the coming of winter after summer is a natural effect of natural causes, and not the work of some malignant power. There were no works on geology to tell of the slow upbuilding of the world through thousands and hundreds of thousands of years; no works on physics to explain that an echo is not an answering voice, but the same voice thrown back by some obstruction. But all of these were natural questions, and the inquiring minds of those primitive people must have satisfaction, so they made up answers and wove them into some of the most beautiful stories and fancies the world has ever known.

This does not mean that some wise man simply invented, all at once, the explanation of such a marvel, for instance, as the sun, with its rising and setting. The explanation grew up gradually. So wonderful an object, which made the whole world bright when it appeared in the east and left the whole world dark when it disappeared in the west, must be more than human; and thus there grew up the idea that the sun was a god—one of the strongest of the gods. Even a god could not walk across the great stretch of the sky between morning and evening, so he was given a chariot with two, four or six horses. True, his face and form could not be seen, but that was because his chariot, his raiment and his crown were so brilliant. In time such stories grouped themselves about almost every natural object: the rustling of the leaves was but the murmuring voice of the goddess who lived in the tree; the hurrying stream was a nymph rushing to join her lover, the sea; the stars were virtuous people placed by the gods in the sky that their virtues might never be forgotten. And the sum of these stories which any people built up for itself is its *mythology.*

Classes of Myths. Many of the legends and myths were of this kind, answering natural questions about natural objects, and these are known as *explanatory* myths. But there are others which have no such object—which seem, indeed, to have no object but to entertain—and these are called *aesthetic* myths. They tell of the doings of gods and heroes—marvelous doings, often, which prove that however strong the gods may have been, they were not always very good. Such stories as that of Jupiter in pursuit of Europa, or of Jason in search of the Golden Fleece, are of this kind.

Why Study Mythology? Why should learned men, with the knowledge of the world at their fingers' ends, interest themselves in these old fables and legends? What is there to be gained from such study? Much, they tell us, which can be gained in no other way, for the mythology of a people makes clear its ideals, its attitude toward natural happenings, and much about its state of civilization and mode of life. For *a mythology is the religion of a primitive people,* and its science and literature as well. To be sure, those words cannot be taken in just their modern meaning. The old myths were a religion because they set forth the doings of the gods and told the people what worship and sacrifices and ceremonies the gods demanded of them; but in other ways they were very unlike a religion as that word is commonly understood to-day. For one thing, the gods whom these myths centered about would seem to the modern mind very unfit to be deities, for they were not only jealous and cruel and vengeful, but actually immoral as well. There is a very long word which scholars apply to this sort of a religion—*anthropomorphism;* but it is

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not a difficult word. It is taken from a Greek word signifying the *human form,* and simply means the attributing of human form and qualities to a divine being.

Then, too, a religion in the modern sense of the term is supposed to try to better people morally, but few of the old mythologies made any such attempt. An ancient Greek, for instance, might lie and steal, but so long as he offered his homage to the gods, and had certain qualities of character, such as courage, he was all right in their sight. Indeed, there was one powerful god, Mercury, who had special charge of thieves and helped them out of their difficulties.

As for science, mythology has a right to that name only in the sense referred to above. It did not, as a modern science does, try to trace effects from causes or work backward to causes from visible effects; it contented itself with assigning supernatural causes to natural events.

Because of the light it throws on all these phases of ancient life, scholars find mythology worthy of study; but the ordinary reader need not go so far for his reason. It is interesting—that is enough; and any child who loves fairy tales cannot fail to be fascinated by these stories woven in the morning of the world when everything was as fresh, as untried, as unexplained to the wisest man as it is to the little child to-day.

Some Interesting Questions. About many of the myths that have come down to modern times there is one very curious fact. It will often be found that a myth which grew up in Greece or in Egypt bears a striking resemblance to one woven by the Norsemen far away in their land of ice, or even that some American Indian tale is strangely like one that the Romans made. Even the wisest scholars have never been able to account absolutely for such resemblances. Some declare that far, far back, long before recorded history began, all these peoples must have had a common ancestry, and that the myths were invented before the separation took place and were carried by each people to their new home, where gradually among new surroundings changes crept in and details were forgotten.

There is another theory, however, which satisfies more scholars. That is that the different primitive peoples, finding themselves in the same world with the same things going on about them, asked themselves the same questions and invented similar explanations.

Then there is another interesting question—whence came all those myths that show the gods as unjust and capricious? Perhaps, declare some students, wise men invented those in which the gods appear as good and kindly, thinking that they might be helpful to the people, while story-tellers of a later time made up the others in a spirit of daring or irreverence. Another explanation is that all the myths are but exaggerated biographies of heroes who came to be looked upon long after their death as gods, or at least as demigods—half-gods.

The Greeks and Romans, the Norsemen, the Egyptians and the Hindus are the nations whose mythologies have been most studied. Of these, the first two are the most interesting, and they alone will be treated here in detail, because the Egyptian and Hindu myths are of such a mystic character as to appeal little to any save scholars. In the *Related Subjects,* under the subheads *Egyptian* and *Hindu,* will be found listed the deities who are treated in these volumes.

Myths Regarding the Creation of the World

One of the questions which demanded an answer was that of the beginning of all things. Anything so wonderful as a world could not just happen, these early peoples believed—some strong power must have made it. Their explanations are interesting.

Greek and Roman. Though the Romans had some deities of their own, they adopted most of those of the Greeks, and took over bodily their account of the creation. First of all, said the Greeks, there was just a vast abyss, known as Chaos. From this there rose Love, which created the goddess Gaea (Earth), and from these two came the sky and the mountains, the sea and the animals. Chaos also brought forth two gloomy creatures, Erebus (Darkness) and Nox (Night), and from these, strangely enough, sprang two beautiful beings, light and day. Gaea bore to Uranus (Heaven) twelve children who grew to gigantic stature and were called Titans. Uranus, first ruler of all things, proved very despotic, and at length Saturn, one of the Titans, with the aid of his mother, dethroned Uranus, and made himself king instead. His period of rule, during which everybody and everything on earth was good and happy, was called the Golden Age, but it did not last. For Jupiter, one of Saturn's sons, overthrew him

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and made himself supreme head of the universe, allotting to his brother Neptune the sea and to his brother Pluto the underworld, or Hades.

Norse. In the beginning, declare the Norse myths, there was no world, but just a great formless abyss. To the north were mist and darkness; to the south fire and light; and out of the mist world there flowed twelve rivers which emptied into the abyss and were frozen there. Fiery blasts from the fire world melted this ice, and a vapor arose which condensed, came to life, and became the giant Ymir, father of all the giants. From the same source was formed the huge cow, Adhumbla, whose milk fed the giant, while she nourished herself by licking the salt from the ice. As she licked she uncovered first the head, then the whole form of Bori, the first of the gods, from whom all the other gods were descended. Bori's grandsons, Odin, Vili and Ve, fought and slew the wicked Ymir, and from his body they formed the world. His flesh became the dry land, his blood the seas, his skull the overarching heavens, his bones the rocks, his hair the forests, and his scattered brains the clouds. Then light was needed, and the three gods placed in the heavens as sun, moon and stars, sparks from the southern fire world. For a time they were much pleased with their work.

JUPITER

He, whose all-conscious eyes the world behold,
The eternal Thunderer sat, enthroned in gold.
High heaven the footstool of his feet he makes,
And wide beneath him all Olympus shakes.
—HOMER (Pope's translation).

ODIN

Myths Explaining the Making of Man

Greek and Roman. For a time the gods had the earth to themselves, but it was a lonesome place. Then one day the Titan Prometheus, working with the clay of which he was so fond, molded a figure in the image of the gods, and breathed into it life. Very proud of this creature of his skill, Prometheus wanted to bestow upon him some helpful gift, but his brother Epimetheus had used up all the good qualities on the animals. To the tortoise had been given a hard shell, to the hare swiftness, to the fox slyness and cleverness, to the bear strength, to the tiger fierceness; and what remained for man? Prometheus knew of something more valuable than any of these, and visiting the abode of the gods he brought back with him in a tube that wonderful thing, fire. The gods were very angry, and punished Prometheus and the race of men severely. See PROMETHEUS and the STORY OF PANDORA, below.

Norse. One day Odin, with two other gods, was walking near the seashore. They were talking as they walked of the beautiful world they had made, and lamenting that there was no one to enjoy it, for their own home was above the earth. All at once Odin espied two shapely trees, an ash (Ask) and an elm (Embla). "From these," he declared, "I shall make creatures that shall live in this world we have fashioned—bask in its warmth, drink of its waters, force its soil to bear; and they shall give us homage which will be sweet to us." Then of the ash he made a man, of the elm a woman; and from these two sprang all the race of men.

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The Myths of Sin and Punishment

These early peoples saw evil all about them, and they were at a loss to account for it. If the gods made the world, and made it good, whence came sin and suffering? They answered the question in various ways.

Greek and Roman. In the Golden Age all men were innocent, but they were not to be allowed to escape the vengeance of the gods because they had learned how to use the most wonderful thing the gods themselves possessed —fire. So Pandora (see below) was sent with her box, and as a result unhappiness spread through the world. Men became greedy and lustful, hating their brothers, and finally the world became so wicked that Jupiter saw that he must sweep it clean of its inhabitants and give it a new, fair start. He caused a great rain to fall and a flood to cover the whole earth, and when it passed only Deucalion and Pyrrha, virtuous servants of the gods, were left. They repeopled the earth by casting over their shoulders the stones which lay on the mountain top about them. Is it not strange and interesting to find, in this mythology of the Greeks, a story so very similar to the Biblical account of the Deluge? It is like meeting, in a far-away land where everything is new, one's next-door neighbor.

Norse. Most of the gods were very good and kindly, but there was one, Loki, who took delight in mischief and wickedness, and it was he, together with the evil giants, who first taught men to sin. They proved apt pupils, and the age of innocence soon passed away, while gods and men had to fight for their very existence with the powers of evil. Some time, the Norse people believed, there should come a dreadful time known as the Twilight of the Gods (Ragnarök), when the evil forces should triumph over the good, and the rule of Odin should come to an end. Out of this destruction, however, a new world was to arise, and innocence and happiness were to prevail again, under the rule of new gods.

The Gods

Greek and Roman. The great gods, according to the Greek poets, had their home on Olympus (which see), where they lived in splendor. Jupiter was their king, and Juno, his sister and wife, their queen; and the others who had the right to live on this mountain top were Minerva, Apollo, Diana, Venus, Mercury, Mars, Vulcan and Vesta. Ceres, a sister of Jupiter, and the goddess of agriculture, had a home on Olympus, but preferred to live on earth, close to her work. There were many, many other deities, some of them, like Cupid, with considerable power, while others had jurisdiction only over the particular stream or tree or mountain which was their dwelling place. (A detailed knowledge of Greek mythology may be gained by reading in these volumes the articles on all the deities named above, and on the other titles listed under *Related Subjects,* subhead *Greek and Roman,* at the end of this article.)

Norse. There were, according to the Norse myths, twelve great gods and twenty-four goddesses, and they had their home in a wonderful region above the earth, called *Asgard* (which see). The rainbow bridge led from Asgard to earth, and the gods crossed it frequently, taking part in the affairs of men. These Norse deities seem to have had far higher morals than those of the Greeks, and the escapades in which they show themselves as licentious and cruel are very few. Besides Odin and Loki, mentioned above, the chief gods and goddesses are Balder, Freya, Frigga, Heimdall, Thor and Tyr, and on most of these there are articles in these volumes.

Illustrative and Explanatory Myths

Illustrative Myths. The whole question of myths may be made far clearer by a number of stories. Some of those which follow are from Greek, some from Norse mythology; some are explanatory myths, while others are of that class known as aesthetic, which make no attempt to explain anything. To each of the nature myths a brief paragraph is added, pointing out the part it had in the "science" of the ancients; but the stories are worth while just as stories, without any such explanation.

Explanatory Myths. The change from summer to winter was one of the common happenings which puzzled the ancient peoples, and very interesting are their explanations of it. The first one, *The Underground Queen,* the Greeks invented; the second, *The Death of Balder,* came from the Norse peoples.

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The Underground Queen

Ceres, the goddess of agriculture, was one of the busiest of the deities. In the springtime, she had to go about from field to field all over the earth, attending to the sowing of the seeds; in the summer, she watched the growth of the grains and fruits; and in the autumn, she went about from place to place blessing the harvests. Her car bore her swiftly, and she so loved the helpful work she did that she never grew tired. Still, she was always glad to come back to her home and to her beautiful daughter, Proserpina, whom she loved very dearly.

Like her mother, Proserpina had her duties to perform, though they were not as difficult as those of her mother. She had charge of all the flowers, and in the springtime, when she walked across the meadows, violets and daisies and buttercups sprang up in her footsteps. Naturally, she loved the flowers, and spent much of her time in the fields with her companions tending them and gathering them for wreaths.

One day, as the girls played in the meadows, they heard a strange, rumbling sound and looked up hastily. A huge, dark chariot with dark horses and a handsome, but gloomy-looking, driver was coming toward them. The girls screamed in terror and started to scatter. But the driver stopped his chariot, leaped to the ground, and seizing Proserpina, bore her away with him in his chariot. The frightened girl called to her companions and to her mother, but the black horses carried them on too swiftly for any help to follow her. Meanwhile the stern-looking man explained to Proserpina that he was Pluto, king of all the regions below the earth; that he loved her and wanted her for his wife.

Proserpina answered:

"I must tell my mother; she will be wild with grief when she finds that I am gone and knows not where to look for me."

But Pluto shook his head.

"She would never let you go with me," he declared.

While they were talking thus, they had come to the margin of the River Cyane, which opposed their passage. Angrily, Pluto struck the ground with the great trident which he carried, and the earth opened and made him a passage back to his underground kingdom.

The darkness in which they found themselves after the earth had closed behind them was delightful to Pluto, whose eyes were tired with the glare of the sun; but to Proserpina it was nothing less than horrible. All her life she had been used to living out-of-doors from daylight to dark; and now this was far, far worse than the blackest night she had ever seen.

"You will like it when you become accustomed to it," said Pluto, noticing that the girl trembled as she sat beside him.

Gradually the way grew lighter, though the light was white and ghostly—not like the beautiful golden sunlight of the upper world.

When they came at length to the huge palace of Pluto, he expected Proserpina to exclaim with delight over its gorgeousness; for Pluto owned all the gold and silver and gems that lay hidden in the earth and had made good use of them in decking his palace. But Proserpina was not used to gorgeousness. She and her mother had lived simply always, and the rich gems which she saw about her were less to her than a handful of fragrant flowers would have been. And all the jewel-studded lights, which to her seemed to serve only to make the gloom more noticeable, she would have exchanged for one look at the stars.

It was the same way with the food. All her life she had eaten but the plainest dishes—simple grains, fruits, bread and milk. And the rich food which Pluto ordered to be placed before her seemed so strange to her that she would not even taste it. This went on for several days, Pluto, in great distress, urging her to eat, and she as steadily refusing.

Meanwhile her mother had been almost distracted with fear and grief. The girls with whom Proserpina had been playing could tell her nothing except that a man in a black chariot had carried off her daughter. Who the man was, she could have no idea. She sought day and night through one country after another for her daughter. The sun, when he came through the doors of the East in the morning, saw her wandering on, stopping everyone to inquire for her lost girl; and the evening star found her still at her task. One day, as she sat for a few minutes resting on a stone, an old man with a little girl passed her. The goddess bore about her no signs of her divinity; she looked like a poor, worn-out, old woman, and they took pity on her and begged her to go home with them. At last she consented to do so, and as they walked the old man told her that his little son was very sick of a fever and that he feared to find him dead.

When they reached the house they found that the child had grown rapidly worse, that he was, in fact, almost dead. You may imagine the delight it caused when Ceres, taking the child in her arms, kissed him and thus restored him instantly to health. Then she asked that she might be allowed to take charge of the boy. Of course the family was only too glad to have so excellent a nurse; but the mother, overanxious for the son in whose sudden recovery she could scarcely yet believe, determined to hide and watch what happened; and it was, indeed, a startling sight which she saw.

CERES

Here Ceres' gifts in waving prospect stand,
And nodding tempt the joyful reaper's hand.

Ceres bathed the boy, murmured some magic-sounding words over him, and then, stepping to the hearth, raked a hollow in the glowing coals and laid the boy within it. The watching mother sprang forward with a cry and snatched her child

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from what she believed would have been its death. But what was her amazement, when she turned around, to see before her, not the feeble old woman whom her husband had brought home, but the radiant goddess Ceres, with her hair of gold and a wreath of wheat and scarlet poppies. Ceres spoke sadly, but not angrily.

"I would have given to your son," she said, "immortality. Now you, by your failure to trust me, have taken from him that gift."

And with these words, the goddess vanished.

Her search still continued, and finally, when it seemed that everything was in vain, Ceres became angry with the earth which had failed to aid her in her search and laid her curse upon it. Drought and famine, she declared, should extend over the whole earth; nothing green should grow; there should be no seedtime, no harvest, until her daughter should come back to her. In vain the people implored her, in vain tales of their suffering came to her ears; she, usually so gracious and kindly, was cruel enough now.

At length she found a clew. The river Arethusa, which comes up from the underworld, had seen in the kingdom of the underworld a queen who looked, she said, most like Proserpina. She was pale and sad, and the white poppies which she wore in her hair were very different from the bright flowers she had been so fond of wearing. But still, beyond a doubt, thought the river Arethusa, it was Proserpina. Ceres knew not whether to be glad or sorry. Her daughter was found, but found where? She went to the meeting place of the gods on Olympus, which she had not visited since the loss of her daughter, and implored Jupiter to use some means to have her daughter brought to her. All the gods felt sorry for Ceres, and they felt sorry, moreover, for the people on the earth, whom Ceres' grief was causing to suffer. At length Jupiter summoned Mercury, the messenger of the gods, and sent him to the regions of the underworld.

"I will do my best," said the king of gods and men, "but the Fates are even stronger than I, and they have declared that if your daughter has eaten anything while she has been in Pluto's realm she may not again come back to the light of day."

When Mercury reached the kingdom of Pluto and stood before the king and the sad-eyed queen, he himself felt sorry for her and hoped that he should be able to take her back with him. When it became known, however, that Proserpina had eaten a few of the seeds of a pomegranate, Mercury shook his head in despair.

"It cannot be," he said, and he went sadly back to the assembly of the gods, leaving Proserpina more hopeless than before.

At length, however, the Fates agreed to make a decree less severe, and declared that though Proserpina must spend six months of every year with Pluto in the dark, underground kingdom, the remaining six months she might spend with her mother on the earth.

You may imagine the delight of Ceres when it came time for her daughter to return to her for the first time. She stood anxiously at the door of her cottage, waiting, watching while the former companions of Proserpina stood about where they might welcome her. Suddenly there seemed to be a new freshness in the air; the grass in the meadows, long dry, grew green before their eyes, and purple violets and yellow buttercups started up all about them.

"She is come!" they cried, and sure enough, she was advancing toward them across the meadows, her hands outstretched, her garments blowing in the breeze, no longer the sad, white-faced queen of the underworld, but the old glad Proserpina who had left them long before.

Ceres, goddess of agriculture, was one of the kindest of the gods, and she would not, the Greeks felt, afflict her people by withdrawing the warmth of her presence all through the winter months without some good reason. So they made this beautiful tale of the loss of Proserpina. When she descended to the underworld each year, Ceres mourned, and no flowers bloomed and no seeds sprouted—it was winter; but when she returned to the upper world, spring came with all its gladness.

The Death of Balder

Balder the Beautiful was the center of all brightness and cheer in Asgard, home of the gods. Everybody loved him except Loki, who was so wicked that he just could not love anybody that was good and happy. He let himself brood upon his hatred for Balder until in time it came to seem to him that the only thing in life he cared for was to injure Balder. And Balder seemed to feel his danger, for he had most terrible dreams of unknown woe to come, which finally he spoke of to his father and mother, Odin and Frigga, who had questioned him as to his downcast looks.

"Do not fear, my son," said Frigga comfortingly. "I shall visit everything on earth—every beast and bird, every treacherous poison and every lurking disease, every stone and tree and creeping thing, and even the ravening fire—and make them promise not to harm Balder."

Feeling much safer, Balder went home to his shining palace and his beloved wife, Nanna, with his old smile, the light of gods and men, again shining from his eyes.

Frigga's journey about the earth made her mother heart very proud, for every object and living thing on earth took so gladly the oath not to injure Balder.

"Why should we hurt the one whom most we love?" they questioned—"the one without whose presence the earth would be a gloomy place?"

Wearied with her journeyings, but very happy, Frigga went back to Asgard, and just as she was about to enter Valhalla she espied a tiny mistletoe plant on the branches of a strong oak. For an instant she stopped, because she had exacted no promise from the little shrub, but finally she passed on without speaking, thinking the mistletoe was too young and weak to do any harm.

When the gods heard of her success they hit upon a new way of amusing themselves. Balder, with his bright smile quite restored and his golden hair shining in the sun, stood upon their great playground and allowed them to hurl at him their weapons. The sharpest spears, the most jagged stones were thrown with unerring aim, but they harmed Balder no more than a shower of

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rose petals. Occasionally some god, with a laugh, would rush upon Balder and strike him with a battle-ax, but the charmed god felt no touch of the ax.

But there was one god who had had no invitation to this sport—Loki; and when he passed by and saw it he was furiously angry. Did all things then love Balder? He hastily made a crafty plan, and disguising himself as a poor old woman, went to Frigga's palace.

"Mother of the gods," said this old woman, "your son Balder will be killed, for the gods are hurling at him their sharpest darts."

"Ah," said the happy mother, "they cannot harm him, for all things in heaven and earth have taken an oath not to injure him."

"Marvelous!" said the visitor. "You must be a proud mother to have such honor shown your son. Did you really mean everything?"

"Yes," answered Frigga. "O no," she added carelessly, "I did not trouble to ask the little shrub on the oak eastward of Valhalla—it could do no one any harm."

With more flattering words Loki slipped away, resuming his own shape when out of sight of Frigga. To the Valhalla oak he hastened, cut off the mistletoe, now grown larger and stronger, and from it fashioned a dart. Then he joined the other gods at the sporting ground, and found them none too glad to see him. He approached Hoder, Balder's blind brother, who stood apart, with no weapon in his hand, and asked him why he did not join in the game.

"Gladly would I do honor to Balder," said Hoder, "but I cannot tell in which direction to throw, nor have I anything to hurl."

"That I can remedy," said Loki. "I will direct your aim, and I will give you the dart which I have in my hand."

Gladly Hoder agreed, and under Loki's guidance threw the mistletoe dart, but instead of falling harmless at Balder's feet it pierced him through and through, and he fell down dead. For a moment there was a horror-stricken silence, then a wail of anguish went up, and the gods rushed toward Hoder and demanded his life. But Heimdall, wisest of the gods, persuaded them that it was not the fault of the blind Hoder, whose grief was great, but of the treacherous Loki, who had now vanished, and he induced them to turn from thoughts of vengeance to plans for bringing Balder back.

Then Hermod, called the Nimble, mounted Odin's eight-footed steed Sleipnir, and rode away to the abode of Hela, goddess of the dead, to plead for Balder's return. It was a long and toilsome journey, through dreadful caverns, cold and dark, but at last he came to Hela's realm and made his plea; but the dark goddess was the daughter of Loki and remained unmoved at the tales of the grief in Asgard.

"Let us see," she said coldly, "whether it is true that everything loved and mourns for him. If all things in the world, whether they have life or no, weep for him, he shall go back, but if one person or one thing refuse to weep, here he shall stay."

Somewhat cheered, Hermod rode back to Asgard and told this tale, and messengers were sent out through all the world to beg everything to weep for Balder. Only success greeted them for some time, but at length they found an old hag sitting at the mouth of a cave, and she only mocked them when they made their request.

"With dry tears will I weep," she scoffed. "Hela shall keep her prey."

"It is Loki in disguise," they whispered as they made their way sorrowfully back to Asgard, where they told the weeping gods that Balder should return no more.

Then they carried the beautiful body of Balder to the seashore and laid it upon his great ship, whereon had been raised a funeral pile. Each god cast into the pile his chief treasure, and then the fire was applied. At the last moment Balder's wife Nanna hurled herself upon the pile, because she could not live without her husband. All ablaze, the ship, with its sails set, was launched for the open sea, and silently the gods stood and watched it as it drifted on and on, burning ever higher and higher. And when the night was almost gone the flame, now far distant, flickered out, and the gods knew that Balder was gone from them forever.

In this myth Balder, the bright and beautiful, represents the summer, all too fleeting in the northern lands; while Hoder, blind and grim, is the winter with its bitter strength. And the death of Balder is of course the slaying of the summer by the winter's cold.

The Greeks had another weather myth which must have been the delight of children in those early days. It is as follows:

The Story of Phaethon

When the boys with whom Phaethon played about the fields and river banks boasted of their fathers, Phaethon was silent. His mother, he knew, was more beautiful than the mothers of his friends; his grandfather was a wealthy, honored man; but his father—he knew nothing whatever about a father. This was bad enough, but when his playmates began to see that such was the fact, they made him suffer constantly.

"No one can play in this game unless he can tell who his father is," one would cry mischievously.

"Let's spend our time telling about the greatest deeds our fathers ever did," another would suggest.

And Phaethon, ashamed and angry, would rush home to his mother and pour out his wrath and shame.

"Some day, Phaethon," she would assure him, "you shall know about your father, and then none of the other boys will dare to taunt you."

"But I want to know now!" Phaethon would insist, stamping his foot.

"You are too young yet, my son," Clymene would reply, looking sadly at her son.

At length one day when Phaethon had grown to be a tall, handsome lad, he came into the house in a fiercer state of anger than usual.

"I will endure this no longer!" he cried. "Either I shall be able to tell those insulting boys tomorrow who my father is, or I shall never look them in the face again."

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Clymene smiled. "Come here, Phaethon," she said, "and let me whisper something in your ear."

What he heard made the boy look, first, astonished, then delighted; and he rushed out-of-doors and back to the place where he had left his comrades, radiant with joy.

"*Now* let's tell tales of the deeds of our fathers!" he cried.

And the other boys looked at him in surprise.

"But you have no father," one of them declared.

"O haven't I!" replied Phaethon, no longer angered by the taunt which had so many times stung him. "You see him every day when he drives his chariot across the highest part of the heavens. He is Apollo, the sun god."

A burst of laughter greeted this proud statement.

"Oho!" cried one boy. "Why could you not have made up that story some years ago and saved yourself a great deal of embarrassment?"

"Do you actually expect us to believe that?" asked another, with a sneer.

Disappointed, angry, Phaethon turned again toward home. Having a father was as bad as not having one, if you could not convince other people of his existence.

But his mother was ready to help him out of this difficulty. Looking at him proudly, she said:

"No father would be ashamed to acknowledge you as his son. Tomorrow morning you may go to Apollo, and ask him whether what I have told you is not the truth."

The impatient boy could scarcely wait for the morning to come, and long before daybreak, while the stars and moon were still to be seen in the sky, he started off toward the East, traveling as rapidly as he could. At last he came to the gorgeous palace of the Sun and was admitted within the doors to the very throne-room of his father. There, on the diamond-studded throne, sat the radiant god, wearing a purple robe and bearing on his head the crown of beams.

"Who are you," he asked, "who have come here to my palace? It is almost time for me to set out on my day's journey and I have not long to talk with you."

Impulsively Phaethon poured out the story of his wrongs, and ended with a plea that his father would give him some sign by which he might convince his skeptical comrades. Apollo laid aside the beams from about his head, which were so dazzling that the youth could not approach closely, and called the boy to him.

"To be sure you are my son," he declared, "a son whom any father might be proud to own. I am willing to give you any proof of the fact, and I swear by the River Styx (and that is an oath which even the strongest of the gods would not dare to break) that I will grant you any wish which you may ask of me."

This was precisely what Phaethon had hoped for, but had hardly dared to expect, and it did not take him long to give his answer.

"There is one thing," he declared, "which will really be a proof. Let me drive for one day your great chariot across the sky; then no one who sees me can doubt that I am your son."

Now Apollo was very sorry for the rash promise which he had made.

"Choose something else, my son," he begged; "what you have asked for is not safe. You can have no idea of the dangers of the path across the heavens. The road at the beginning of the journey slopes upward so steeply that even my horses can hardly climb it; the middle of the road is so high above the earth that even I, myself, become dizzy when I look down; and the last part of the road slopes downward so rapidly that it is almost impossible to hold in the horses. If it is hard for me, think what it would be for you."

But Phaethon refused to think. He had set his heart on this one thing and this one thing he would have. He knew his father could not break the oath which he had sworn by the River Styx, so he persisted in his demand. At last, attended by the Seasons, the Days, the Months, the Years, and the Hours, Apollo led the way to where the sun chariot stood waiting. It was the most gorgeous chariot that Phaethon had ever looked upon—of gold and silver and precious gems—and his heart beat proudly that he was actually to have the guiding of the magnificent car for a whole day. The horses were led forth and fastened to the chariot, and Aurora, the goddess of dawn, threw open the doors of the East, through which the sun in its splendor was presently to rise. After a final plea, which Phaethon stubbornly resisted, Apollo anointed the boy's head with ointment so that he might not be scorched by the brightness of the beams, and then set the crown of rays on the young head.

"Remember, my son," he said, "do not drive too high or too low; a middle course is best. Above all, do not attempt to use the whip, for the horses are spirited; and hold tight to the reins."

Only half heeding his father's instructions, Phaethon sprang into the chariot, grasped the reins, and shaking them over his steeds, started out through the open door.

It did not take the horses long to feel that it was an unpracticed hand that grasped the reins, and, taking the bits in their teeth, they dashed out of the traveled road and wildly up the heavens. The courage with which Phaethon had

PHAETHON'S RIDE

"Up, up, up, went the horses, and then as suddenly downward, almost taking the breath from Phaethon's body with their rapid plunge."

started out did not last long. Below him—a dizzying, sickening distance below—was the earth and the sea. What if he should drop from this awful height! And there, when he looked about him in the heavens, were even worse sights; the Big Bear and the Little Bear, the Scorpion and the Lion, the huge Crab—all of these seemed to be reaching out toward him as he dashed among them. Up, up, up, went the horses, and then as

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suddenly downward, almost taking the breath from Phaethon's body with their rapid plunge. They came so close to the earth that mountains which for thousands of years had been snow-crowned lost their snow-caps and stood bare and brown; rivers were dried up; a great part of Africa was burned to a desert; and many of the people were scorched almost black.

Phaethon had long before this dropped the reins, and he stood shaking with terror. Cries came up to him from the earth, cries of pain and terror and fright from the people of the countries over which he was passing. But he was too much afraid for his own safety to worry about others.

The cries did, however, reach the ears of Jupiter, the king of the earth and heavens, where he sat on his throne on Olympus, and he, horrified, looked out upon the course of the wild boy. The other gods and goddesses gathered about him and besought him to save the earth.

"There will be no beauty, no freshness left," they cried. "There will be no cool springs and lakes for the nymphs to live in; no great trees and forests where dryads may shelter themselves."

"I call you all to witness! There is no other way to save the earth but this!" cried Jupiter, and he raised his arm and hurled a bolt of lightning at the luckless Phaethon.

Struck from the chariot, the boy fell headlong into a great river, while the horses trotted quietly across the remaining part of their course and disappeared into the doors of the West.

This is but a dramatic way of telling about the droughts of summer and the suffering caused to men and to plants by them, while the lightning which Jupiter hurled to end Phaeton's reckless drive represented the thunder shower by which a drought is often broken.

Some myths have in them but a touch of the nature element, so slight that it is hardly safe to say that it is there. The tale of Arachne, from which comes *Arachnida,* the scientific name for the spider family, is given below, and is one of these myths. It is easy enough to fancy that some Greek, watching a spider spin and spin, and spin, may have thought, "Could there be any worse punishment than that endless carrying on of an endless task?" And then perhaps there came to him the idea that maybe it was a punishment, and he made some such story as this:

The Story of Arachne

Arachne had many things of which she might have been very proud; she was young, beautiful, and had many friends. But she cared less for any of these things than she did for the fact that she was a very skilful weaver. People came from all the country near her home to see the beautiful patterns which she wove on her loom; and as they watched the web grow under her fingers they would exclaim:

"Surely Minerva herself must have taught you; in no other way could you have learned to do such wonderful work."

Most girls would have been proud to have been taken for a pupil of the wisest and most skilful of the goddesses, but Arachne was so proud that she could not bear to have people think that even Minerva ever could have taught her anything. Finally her boasts came to the ears of Minerva herself. Now Minerva was not naturally cruel or revengeful, but there was a wickedness in any mortal's setting herself up to surpass a deity which even Minerva could not pardon. Determined, however, to give the boastful girl a chance, Minerva took the form of an old woman and went to Arachne's home.

ARACHNE

She filled her web with subjects designedly chosen to exhibit the failings and errors of the gods.

"Foolish girl," she said, "how do you dare to set yourself up as an equal in skill to the goddess of the arts? Do you not know that she could punish you severely for such boasting?"

"Let her!" said Arachne. "I am her equal, and I am willing that she should know what I have said. Let her come and match her skill with mine—and if I am beaten I will pay the penalty."

"Foolish girl!" cried the goddess, dropping her disguise and appearing in her own radiant form; "the trial shall take place here and now."

All those who stood by were terrified; some of them fell at the feet of Minerva; others besought Arachne to yield before it was too late. But the proud girl remained defiant, unafraid.

So the contest began, while the bystanders stood breathless with fear and admiration. Minerva at her loom worked rapidly, the shuttle seeming to fly as she passed it back and forth through the threads; and a marvelously beautiful pattern soon began to show itself in the web. But Arachne's web seemed, to those who watched, little, if any, less perfect than that of the goddess herself. Only, what was this which the reckless girl was daring to do? Not content with defying one of the gods, she chose for her subject in the web she was making the faults and failings of the dwellers on Olympus, showing them so clearly that nobody could mistake.

Her own web finished, Minerva turned and looked at Arachne's. It was wonderful—the goddess could not but admit it to herself. But the presumption! the wickedness of it! thus to hold up the faults of the gods before these staring people.

With her shuttle she tore the beautiful web of Arachne from top to bottom, and then turned to the girl herself.

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"Your sin merits death," exclaimed the angry goddess, "but death shall not be your portion. Since, however, you have been so fond of weaving, your punishment shall be, that forever and forever you and your descendants shall make your threads and weave your webs. And wherever men see you they shall tear your webs as I have torn this, and shall drive you from them as I drive you from me now."

And touching the girl upon the forehead, she transformed her into a spider.

But all the explanatory myths did not deal with nature problems; some were answers to moral questions, and one of the most interesting is that which tells of the coming of sin into the world. Men had become as the gods, since they had the fire given them by Prometheus, and they must be punished for their presumption. The Greeks told of their punishment thus:

The Locked Box: The Story of Pandora

In all the beautiful world there were no women —only men, who lived in a state of utter ease. The food which they needed grew ready to their hand on the trees and shrubs; the air was full of the fragrance of flowers, and there was nothing to do all day but to enjoy themselves and exercise their perfect bodies, which had never known a touch of any disease. But the gods in council decided that a vexatious punishment should be sent to man, and that that punishment should be *woman*. Accordingly, they ordered the artist-god Vulcan to make one. Very beautiful she was, and the gods took delight in bestowing upon her wonderful gifts. Apollo made her musical, Mercury gave her powers of persuasion, Venus made her lovable, and in the end they called her *Pandora,* the *all-gifted.*

Mercury, the messenger-god, was commissioned to take the maiden to earth, and to leave her with Epimetheus, brother of Prometheus; and with her was sent a curious box, about the contents of which no word was said. Epimetheus received her gladly—never had he seen so exquisite and so alluring a creature; and all his friends rejoiced in his good fortune, for envy as yet had not entered the world. The songs of Pandora Epimetheus and his friends found more beautiful than the songs of the birds, and they loved to gather about her when the purple twilight was falling and listen to the tales she invented for them.

For a time Pandora was very happy. The world was new and very wonderful, and every day there were countless things to learn. She found out about the mysteries of fire, which looked like a great wind-tossed flower but was so powerful; about the delightful warmth of the day and the delightful cool of the night; about the tastes of the various fruits, all so delicious but all so different. But in the back of her mind there was one persistent, nagging little trouble that grew larger and larger and threatened to spoil all her pleasure. For Mercury had forbidden her, with the sternest words and the severest look, to open the box he had left with Epimetheus, so there was one thing in the world that she could not find out about. And she wanted to know—O, how she wanted to know!

"Probably," she thought, "there are lovely things in the box which would make me even more beautiful—white robes like Juno's, or a golden girdle like that which Venus wears."

Day after day she fretted, and Epimetheus felt the first sadness he had ever known creep over him as he saw Pandora's sadness. Finally she told him what was troubling her, and besought him to open the box; for there was the golden key hanging by a golden cord. But Epimetheus was horrified.

"Do that which the gods have forbidden?" he cried. "Never! The box shall stand in my house forever, and I shall never open it," and he went back to his companions, leaving Pandora to indulge her curiosity alone.

For a time Pandora resisted, but one day when she was left alone in the house the temptation became too strong for her. She slipped the key into the lock, turned it slowly, still but half intending to open it, and then, suddenly, threw

PANDORA

Hope sole remain'd within, nor took her flight.
—HESIOD (Elton's translation).

back the cover. No beautiful glitter met her eyes, but only a throng of winged pests which buzzed out at her and hurt her with their sharp stings. There was disease in many forms—fever and cholera and rheumatism; there were spite and envy and green-eyed jealousy; there were black worries and gray despairs. She had loosed the ills which were ever after to plague the earth.

In a cloud they swept through the door and windows, darkening the sun, and soon Epimetheus and his companions, at play on a distant green, heard their angry buzzing and felt their stings. And at once dissensions sprang up, and angry words rushed from lips which till now had known only loving ones. Comrade turned upon comrade, and each saw in the other's face his own scowl reflected. The age of innocence had gone, never to return.

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Meanwhile at home Pandora sat dismayed. She had slammed down the lid of the box, but too late to shut within it any of the buzzing throng. At length she heard a tiny tapping on the lid, and a tiny voice that said "Let me out! Let me out!"

"No!" she cried. "If there is one of you in there, you shall stay."

But still the tapping and the pleading kept up, and finally Pandora, whose curiosity was not all dead, opened the lid ever so little and peeped in. And there was the most beautiful creature with white wings, which flew merrily out into the light.

"I am Hope, I am Hope," it sang, and it seemed to Pandora that the world grew brighter with its song. Away it flew to the quarreling Epimetheus and his friends, and at its approach the buzzing troubles and wickednesses took their flight, and peace came again. Not the same peace—the peace of innocence had gone forever; but while there was Hope in the world, those men who for the first time had tasted sorrow and anger realized that no troubles would be too bad to be borne.

Aesthetic Myths

The ancients had no novels, no short stories such as make up so large a proportion of the reading matter of to-day, but they did have their myths which must have answered just the same purpose. These aesthetic myths seem to have had no teaching purpose, either moral or intellectual, save as any good story teaches its own lesson. The first that follows here is one which the Norse children must have listened to with delight but with shudders; while the second was probably a favorite with the young people in the sunny land of Greece.

The Fenris Wolf

Nothing proved more clearly that Loki was not fit for the company of the gods than the fact that he wandered off to the home of the giants and there married the fiercest giantess of all, Angerbode. Naturally enough, the children she bore him were not sweet and beautiful, but surely even from her Loki could not have expected such offspring. First of all there was the gloomy daughter Hela, a very strange person to look upon; for she was half blue and half white, and in her deep eyes there was a look of such unconquerable sadness that no one who looked upon her ever smiled again. But the other two children were much, much worse. One was a great slimy serpent, with vicious poison fangs, the other a huge wolf with glaring eyes and teeth as sharp as swords. Loki himself was not afraid of his children, but the other gods looked down from Asgard in dismay, for the monsters grew as much in an hour as any ordinary creature would grow in a year.

"Something must be done," pondered Odin, king of the gods, "for soon we shall not be safe on our thrones from the hatred I see burning in their eyes."

So he sent Thor to bring them to Asgard before they became too large and strong for even this most powerful of the gods to manage, and all the gods gathered in council discussing their fate. First Odin turned to Hela.

"You are not vicious," he said, "but the death in your eyes makes it unsafe to leave you on earth among men, and you shall be sent to reign over the underworld—the vast kingdom of the dead."

Without a word Hela turned and left the council hall. There was no happiness in the world, anyway, and even the world of the dead—of those who had met inglorious death in their beds instead of dying bravely on the battlefield—could add nothing to her sadness.

Then Odin turned to the serpent, and though it could understand very well the language of the gods he said no word to it, but seized it in his arms and threw it over the wall that encircled Asgard. At length to the ears of the listening gods there came a great splash, which meant that the serpent had fallen into the sea. There it grew and grew to such an enormous size that it stretched about the whole earth, holding its tail in its mouth.

But there still remained the Fenris wolf, the most troublesome of the three.

"Let us kill him," whispered one on Odin's right hand.

"Not so," replied Odin, "for we have one and all sworn that no blood shall be spilled in the beautiful city of the gods. Let us see whether by kindness we cannot tame him."

So the wolf was turned loose to prowl about the streets of Asgard, and the night was often made hideous by his howls. As he grew rapidly larger he grew fiercer, also, and only the war god Tyr, the bravest of all the gods, dared go near enough to him to feed him.

"This cannot go on," said Odin one day in council. "Son Thor, can you not make in your smithy a chain heavy enough to bind him?"

"I shall make a chain which I myself cannot break," said Thor, "and I am very strong." Away he hurried to his smithy, and before long they heard his fire roaring, and his hammer clanging on his anvil. The next morning he showed his chain proudly, and told of his crafty plan for binding the wolf.

"Come, Fenris," he called, "let us play a game. This chain is so strong that not all of us can break it, but if you will allow us to bind you with it you can prove how much stronger you are than the gods."

Growling and glaring, the wolf drew near and let them bind him, and very tight they drew the chain. But without the least effort the wolf rose, shook himself, and threw off the broken, clanking chain. The gods were dismayed, all save Thor, who vowed that he would make a chain that could not be broken.

In the morning, after the gods had listened all night to the beats of his hammer, he appeared among them with a chain which he declared was the strongest that could possibly be forged. Again they proposed the same test to the wolf, and again he submitted, knowing his own strength too well

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to fear. The gods held their breath for a moment, hoping—hoping; but one shrug of the great, hairy shoulders, one stretch of the powerful limbs, and the wolf stood free.

Then Odin, almost despairing, sent a messenger to the dwarfs, those wonderful workmen who have their smithy underground, and who have at their disposal all the riches of the world. And they, at the bidding of the gods, fashioned a most marvelous chain, which was made not of iron, but of the noise of a cat's footfall, the roots of stones, the spittle of birds, the beards of women and the nerves of bears. Very soft and fine it looked—no stronger than a silken cord; but the dwarfs had guaranteed their work.

The gods thought they would have no trouble with Fenris this time, and called him joyously, but he suspected their scheme.

"You shall not bind me with that," he growled. "If it is really but a frail string you would find no pleasure in binding me with it; if it is enchanted, I can never break it."

ATALANTA'S RACE *From painting by Poynter.*

Hippomenes turns her astray
By the golden illusions he flings on her way.
—MOORE.

In vain they urged him, insisting that it was but a game; he knew that they feared and hated him, and shook his shaggy head. Finally he said mockingly:

"Very well, if it's a game, you may play at it too. If one of you will put his hand into my mouth, you may wrap me with the cord as securely as you will."

The gods dared not show their dismay, for that would be equivalent to confessing their craftiness, so the brave Tyr stepped forward and thrust his hand between the awful jaws. Then Fenris lay quiet, while they wrapped him securely with the cord.

"Now!" said Thor, and the wolf tried to rise. He twisted and struggled, but in vain, for the magic cord but drew the tighter and the blood ran from his body. When he saw that the gods made no effort to release him he snapped off Tyr's hand, and from that time on the great god of battles was one-handed. It was a heavy price to pay, but not too heavy, Tyr felt, for it had saved the gods from their worst enemy. Fenris roared and growled and shook the ground with his struggles, but the dwarfs' masterpiece held firm, and again the gods might go about their city without fear of the dreadful fangs at their heels.

The story which follows is one of the most pleasing of all that have come down from the old Greek myths.

The Story of Atalanta

The king of Boeotia had one daughter, Atalanta. While she was more beautiful than any other girl in her father's kingdom, she remained a maiden at home in her father's house, long after all her companions were married. And this was not because she lacked suitors. Young men, handsome, strong, rich, fearless, came constantly to her father's palace, seeking her in marriage, and it was not because the king refused his consent that they went away unhappy.

Atalanta herself was the cause of their unhappiness, for she had made a vow that she would not marry, but would devote her life to the chase, like the goddess Diana, whom she so much admired. It was hard, however, to be constantly refusing without having any good reason that was apparent, so she made up her mind to give a different answer to her suitors—an answer which would leave them no argument. Accordingly, when the next youth presented himself, she replied:

"I shall marry the man who can defeat me in a race; but everyone who tries and fails shall be put to death."

This may sound as if Atalanta was a very cruel princess, but her idea was simply to keep people from bothering her with the question of marriage. However, her resolution did not have the effect she expected, for there were still found young men who were anxious enough to have the princess for a wife to submit to the trial which she proposed.

Now, Atalanta could run as swiftly as the deer she hunted in the forests, and however much a youth might pride himself on his speed, he was certain to find it was no match for hers. A number of suitors had met their deaths by reason of their love for her, and the people of her father's kingdom were beginning to murmur among themselves at her cruelty. One day there acted as judge in one of the races a youth, Hippomenes, by name, who had never before seen Atalanta. As he took his place in the judge's

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seat, he said to himself, looking around at the crowd which had gathered to witness the race:

"How can any man be so foolish as to risk his life for the sake of this one girl when there are so many beautiful girls to choose from?"

But when he saw Atalanta step forward, ready for the race, he changed his mind; for never, he felt sure, had he looked upon anything so beautiful, and he found himself hoping that the youths who ran with her would be defeated.

And as she ran she looked even more beautiful. Her bright hair blew backward in the breeze, a lovely color flushed her face and her gracefulness in running was wonderful to look upon. Of course she won, as she always did, and the youths who had made trial of their skill with hers were mercilessly put to death. Even this, however, did not frighten Hippomenes.

"What glory," he said to her, "can there be in defeating weaklings like those who just ran with you? Tomorrow, if you will, I shall try my speed and endurance against yours."

As Atalanta looked at him, she felt that she would scarcely wish to defeat this young man, so handsome did he look, so brave, so worthy to be her partner. Still she only nodded her head and made up her mind that she would give him as hard a trial as she had given the others.

Now, Hippomenes knew, having seen her run, that he could never hope to conquer her in a fair race, but he thought:

"There are ways in which it can be managed. Every girl is curious, every girl likes beautiful things."

Accordingly, the next day when he took his place beside Atalanta in the starting line, he had in the front of his robe three beautiful golden apples. As the signal for starting was given, the two sped forward, side by side. For a moment it seemed as if he would actually outrun her, but with a fleet step she passed him. Instantly he seized one of his golden apples and tossed it a little ahead of her. She caught her breath, almost stopped, but her desire to win was strong; however, the beautiful golden sphere looked so tempting that she hastily stooped to grasp it. Running with all his might, Hippomenes threw a second apple, and again Atalanta slacked her speed and seized it, yet kept fairly ahead of her fellow contestant. Almost despairing, Hippomenes tossed slightly to one side of the course the third apple, the largest, ruddiest, most beautiful one of all.

This was too much for the princess. She stopped suddenly, her draperies whirling about her, stooped, and seized the apple. The delay was but for a second, although longer than on the two previous occasions, but that was all Hippomenes needed. He passed her, and with a final rush, reached forward, and touched the maple goal. He had won! and the cheers of the people told that they were glad that at last their beautiful, haughty princess had been conquered.

And as Atalanta came toward Hippomenes and held out the hand in which lay the beautiful golden apples, all could see that she looked far more happy in her defeat than she had ever looked before in all her victories. F.J.C.

Consult Gayley's *Classic Myths;* Guerber's *Myths of Greece and Rome;* Keary's *The Dawn of History: An Introduction to Prehistoric Study* (new edition); Fiske's *Myths and Myth Makers.*

Related Subjects. For specific information on mythological subjects, the reader is referred to the following articles in these volumes:

EGYPTIAN

Ammon	Osiris
Apis	Re
Athor	Serapis
Isis	

GREEK AND ROMAN

Achates	Eris
Achilles	Europa
Actaeon	Eurydice
Adonis	Euterpe
Aegis	Fates
Aeneas	Fauns
Aeolus	Fortuna
Aesculapius	Furies
Agamemnon	Galatea
Ajax	Ganymede
Alcestis	Golden Fleece
Amazons	Gorgons
Ambrosia	Graces, The Three
Andromache	Hades
Andromeda	Harpies
Antigone	Hebe
Aphrodite	Hecate
Apollo	Hector
Apple of Discord	Hecuba
Arachne	Helen of Troy
Arethusa	Helios
Argonauts	Hercules
Argus	Hero
Ariadne	Hesperides
Atalanta	Hydra
Atlantis	Hygeia
Atlas	Hymen
Aurora	Hyperion
Bacchus	Io
Baucis and Philemon	Iphigenia
Bellerophon	Iris
Boreas	Ixion
Cadmus	Janus
Calliope	Jason
Calypso	Juno
Cassandra	Jupiter
Castor and Pollux	Laocoön
Cecrops	Lares and Penates
Centaur	Lethe
Cerberus	Luna
Ceres	Mars
Charon	Medea
Chimaera	Medusa
Chiron	Menelaus
Circe	Mentor
Clytemnestra	Mercury
Cupid	Midas
Cyclops	Minerva
Daedalus	Minos
Daphne	Minotaur
Deucalion	Muses
Diana	Naiads
Dryads	Narcissus
Echo	Nectar
Egeria	Nemesis
Elysium	Neptune
Endymion	Nereids
Erebus	Nereus

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Nestor
Nike Apteros, Temple of
Niobe
Nymphs
Oedipus
Olympus
Orestes
Orion
Orpheus
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Pan
Pandora
Paris
Pegasus
Pelops
Penelope
Perseus
Phaedra
Phaethon
Philomela
Pluto
Plutus
Polyphemus
Pomona
Priam
Prometheus
Proserpina
Protesilaus
Proteus
Psyche
Pygmalion
Python
Rhadamanthus
Rhea
Saturn
Satyrs
Scylla
Semele
Sibyl
Silenus
Sirens
Sisyphus
Somnus
Sphinx
Styx
Tantalus
Tartarus
Terpsichore
Theseus
Thetis
Titans
Ulysses
Urania
Uranus
Venus
Vesta
Vulcan
Wooden Horse

HINDU

Brahma
Siva
Vishnu

NORSE

Asgard
Balder
Frey
Freyja
Frigga
Heimdall
Hel
Lok
Niflheim
Norns
Odin
Sigurd
Thor
Valhalla
Valkyrie
Yggdrasil

GENERAL

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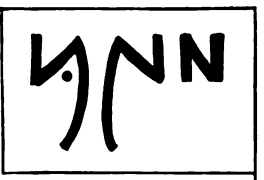
Nn



N is the fourteenth letter of the English alphabet. Like *m*, it has come with little change of form or value from the Phoenician alphabet, though in the course of the change in the direction of writing to the present left to right method the letter has been turned around. The Phoenician name of the letter was *nun*, which meant *fish*, and some scholars have succeeded in seeing in the original form a crude sketch of a fish's head with open mouth. The resemblance, however, is far from striking.

The sound of the letter in English is simple and unvarying. It is a nasal, by far the most common of all the nasal sounds, but is also classed as a liquid or semivowel. In combination with *g* it forms a nasal, as in *sing*, the *g* serving merely to modify the *n* and not being pronounced itself. In a few words, *n* is silent, as in *hymn*.

NABOPOLASSAR, *nab o po las' ar,* a Babylonian king from 625 to 605 B. C., the founder of the new Babylonian empire. His parents were not members of the ruling class, so his rise to sovereignty was by means of his own efforts. At first he was a vassal king, but through a revolt gained power over the practically independent district of Chaldea. Later, in 606 B. C., with the aid of the Medes and Scythians, he destroyed the Assyrian empire through the fall of Nineveh, thus making his the supreme authority in the Euphrates valley. Nebuchadnezzar, his son, succeeded him, receiving a prosperous and extensive empire. By means of a canal Nabopolassar brought the waters of the Euphrates River to the city, enlarged the Babylonian temple, Marduk, and greatly beautified the city—in all showing himself a man of energy and power. See ASSYRIA.

NADIR, *na' der,* the point of the heavens directly opposed to the zenith, the latter being the point directly over our heads. The zenith and the nadir are the two poles of the horizon; the zenith, nadir and center of the earth are therefore in one straight line. The word is frequently used to describe the lowest depression of spirits, or the lowest point of a career. Hawthorne, in his *Blithedale Romance,* uses the terms *nadir* and *zenith* to point a contrast, as follows:

> The two theories differed as widely as the zenith and the nadir.

This is a comparison which is used frequently in speech and in writing.

NAGASAKI, *nah ga sah' ke,* one of the principal cities of Japan, a seaport lying on a peninsula on the northwestern coast of the island of Kiushiu. Its harbor, one of the most beautiful in the world and one of the safest in the Eastern hemisphere, is about three miles long and six miles wide. Nagasaki is the first port of entry for vessels approaching Japan from the south and west, and it has the largest dock in the empire. This was built in 1879 with the expectation of promoting trade; it is 460 feet long, eighty-nine feet broad and twenty-eight feet deep. The city figures largely in the shipbuilding industry, and is an important coaling station. Previous to 1858 Nagasaki was the only Japanese port having communication with Europe. The houses are not particularly attractive, but the streets are clean and well paved. On the hills behind the town are various Buddhist temples. The chief exports are

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rice, coal, camphor, tobacco and flour. Population, 1913, 164,500.

NAGOYA, *nah go' ya,* the capital of the province of Owari, Japan, best known as one of the great centers of the pottery trade. The city is situated near the head of Isenumi Bay, on the island of Hondo, 235 miles from Tokyo and ninety-four miles from Kioto. The first glazed pottery produced in Japan was made in the thirteenth century by Kato Shirozaemon, at Seto, thirteen miles from Nagoya, and all the products of the great potteries of the former city are taken to Nagoya to be sold or for export. Nearly the entire population is engaged in the pottery industry, and the city has also large cotton, silk and embroidery factories. In this city originated the Japanese system of enameling known as *cloisonné.* The most important of the buildings is the castle of Nagoya, erected in 1610, and now used as a military depot. Population in 1913, 447,950.

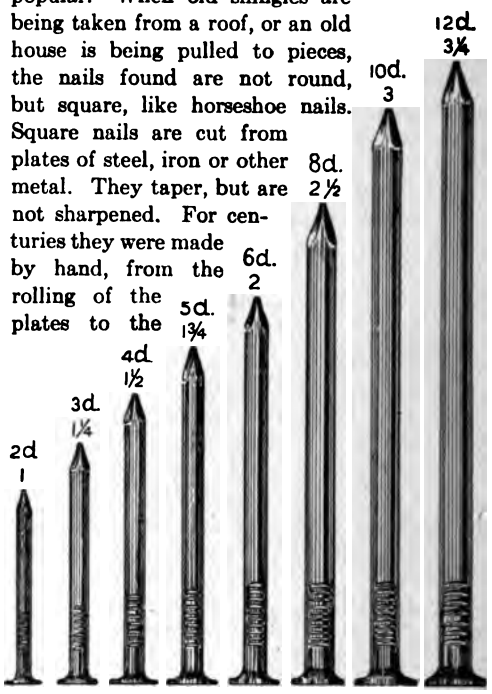
NA'HUM, the seventh of the twelve minor prophets of the Jews. Nothing is known of his life or personality excepting that he was an *Elkoshite,* and no one knows where or what Elkosh was. In the book of the Old Testament which bears his name, Nahum foretells the fall of Nineveh and in striking and fanciful terms prophesies its utter destruction and ruin. He compares Nineveh to Egyptian Thebes *(No-Amon),* which had evidently just been destroyed, thus fixing the date of his prophecy around 606 B. C.

NA'HUM, the seventh of the twelve minor in classical mythology, presided over trees and woods, so the naiads were the special divinities of springs, fountains, brooks and rivers. They were greatly venerated, and goats and lambs were sacrificed to them; milk, fruit and flowers were offered to them, and oil, honey and wine were poured out as libations.

NAILS, parts of the outer skin, or epidermis, especially developed to afford protection or to provide weapons of offense and defense. Claws and hoofs of animals are forms of nails, as are the long talons of such birds as the eagle. In some instances the nail constitutes nearly the entire foot, as the hoof of the horse. The chemical composition of nail is the same as that of horn, which is made up of carbon, hydrogen, oxygen, nitrogen and sulphur.

The nails of man appear on the upper surface of the ends of the fingers and toes, and serve as protective coverings. The skin below the nail, from which it grows, is called the *matrix.* Near the root of the nail the cells are smaller and carry less blood; the white, crescent-shaped spot which they cause is called the *lunula* (from *luna,* meaning *moon*). If a nail is torn off it will grow again, provided the matrix has not been severely injured. The state of health is often clearly indicated by the nails, the presence of fine grooves across them being a sign of physical weakness. Doctors find a study of the nails a help in the diagnosis of certain diseases.

NAILS, *naylz.* Of the billions of nails made in America every year nearly all are cut from steel wire, yet it was not until the last quarter of the nineteenth century that the wire nail, or French nail, as it was at first called, became popular. When old shingles are being taken from a roof, or an old house is being pulled to pieces, the nails found are not round, but square, like horseshoe nails. Square nails are cut from plates of steel, iron or other metal. They taper, but are not sharpened. For centuries they were made by hand, from the rolling of the plates to the hammering which flattens the heads; but in 1786 a machine for doing most of the work was patented in the United States. A century later the wire nail was beginning to be accepted as a substitute for the cut nail, and as it is much cheaper to manufacture, it has rapidly displaced the older style. The wire nail may be bent and does not break as easily as the ordinary cut nail, but the latter holds better and is more durable. A specially-forged cut nail is used in horseshoeing; it is more pointed than the ordinary cut nail.



WIRE NAILS

The numbers refer to the length of the nails in inches; *d* means *penny.* Actual lengths are pictured.

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Formerly nails were always described as *sixpenny, eightpenny,* etc., the word *penny* either referring to their price in medieval England or, more probably, being a corruption of *pound.* It is now becoming customary to describe nails by their length. The illustration will be valuable to anyone who has to purchase wire nails and is unfamiliar with the different sizes.

Nails are sold by the pound or in kegs of one hundred pounds. The price of all large nails is usually the same as that of the four-inch nail, but the smaller nails increase in price as they decrease in size.

Consult Smith's *Treatise on Wire; Its Manufacture and Uses.*

NAMES, Personal. A thousand years ago people had less need for names than we now have. There were fewer people in the world, and they moved about less, most of them never going more than a few miles from their birthplace. Besides, there were no newspapers, and nearly every person that a man had heard of he had also seen and could describe. So each boy or girl was given only one name instead of the three which most of us have to-day. If two boys in the same village were named *John,* one might be known as *Peter's son,* the other as *Jack's son.* When they grew up they could be distinguished as *John the carpenter,* and *John the shepherd,* or, perhaps, *John long* and *John short.* If one of them moved to a new home he might be spoken of as *John from the North,* or *John the Scot,* or *John from Selkirk.*

All of these names, except the one *Christian* name, were merely nicknames and might be changed at any time by the whim of friends. Originally even the name given a child by its parents had a meaning. So among the Hebrews *Isaac* meant *the laugher,* while *Solomon* signified *prince of peace.* All of our own common names for boys and girls were once equally significant. The same custom prevailed among the early Saxons, as we see from the name *Ethelwulf,* which means *noble wolf,* and it was revived by the Puritans, who called their daughters Mercy, Patience, Faith, Hope or Charity. All primitive peoples give names that have meaning, such as the familiar Sitting Bull and Rain-in-the-Face of the American Indians.

Gradually, no one knows just how, it became customary for nicknames to pass from father to son and be family names. Of course this had been the practice among the land-owning classes, whose members were known by their estates. Thus, the German and French names *von Hindenburg* and *de Chateaubriand* mean *from Hinden Castle* and *from Briand Castle.* Very often, in the days when few could read or write, names became corrupted, and few of us know what was the original name of our family. Thus, Sanderson came from *Alexander's son* and Mitchell from *Michael.* Fitzhugh, Pugh (which was once *ap-Hugh*) and McCue are really the same, for *Fitz* and *ap* are Norman and Welsh for *son of,* while *Mc* means either the *son of* or *from the clan of.* The Irish *O',* the German *-sohn* or *-son,* the Scandinavian *-sen* or *-son,* the Russian and Serbian *-ovitch,* and the Rumanian *-escu* are all like the English *-son,* and the names Johnson, Johansson, Hansen, Ivanovitch and Jonescu are exactly alike in meaning.

Most people write their given names first and their family names last, but the Chinese reverse this plan. Thus Dr. *Sun Yat Sen* is properly called *Dr. Sun,* not *Dr. Sen.* An Italian workingman called Enrico Carbone, if asked his name, will usually say *Carbone Enrico,* but this is because he has been so taught in the army or in school, not because of national tradition.

NAMUR, *na mür',* an important industrial city of Belgium, and capital of the province of Namur, situated on the left banks of the Sambre and Meuse rivers, thirty-five miles southeast of Brussels. On its citadel hill, now used as a recreation park, the Aduatici, whom Caesar conquered, are supposed to have had a fortified camp. This historic and picturesque city has been many times a battle ground; three times it was stormed and captured by the French, and once by William III of England, and in August, 1914, after a terrific bombardment of forty-eight hours, damaging it to an extent unknown, it surrendered to the German army (see War of the Nations). It was defended by a circle of nine forts. In times of peace Namur is a prosperous manufacturing and trading center, with iron and brass foundries and noted manufactories of cutlery, machinery, chicory, glass, leather and bronze art products. Iron and coal deposits are found in the vicinity, and trading vessels ply up and down the Meuse. Among the distinctive features of the place is a beautiful cathedral in Renaissance architecture; the city is proud, too, of its art gallery and the Archaeological Museum, which contains a valuable collection of Roman and Frankish antiquities. In 1912 the city had a population of 32,453.

NANAIMO, *na ni' mo,* a city in British Columbia, located on the east shore of Vancouver

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Island. It is forty miles directly west of Vancouver, with which it has ferry connection, and is seventy-two miles north of Victoria, with which it has connection by the Esquimalt & Nanaimo Railway (now a part of the Canadian Pacific system). The city is the capital of the electoral district of the same name. Population in 1911, 8,306.

Nanaimo is known chiefly as a coal-mining center and as a port. The Nanaimo coal field, with an area of 300 or more square miles, is the largest and richest in British Columbia, and supplies more than half of the province's annual production of that mineral. The coal mines, in fact, gave the city its popular name, the *Coal City*. As a port Nanaimo offers practically unlimited water frontage and a harbor which is remarkably safe and free from fogs. Nanaimo and its neighborhood have a large amount of shipping, in consequence of the export of coal to ports on the Pacific coast. It is also a lumbering and fishing center.

Nanaimo was founded in 1836 as a Hudson's Bay Company's post. It has never had a boom, but since the first development of the coal mines has grown steadily. It was incorporated as a city in 1874, and in 1900 purchased the waterworks system, which has remained under municipal control. The city also owns the electric-lighting system. The city has a fine high school and four public schools—the Central, South Ward, North Ward and Middle Ward. A Dominion biological station is situated on Departure Bay, a short distance north of the city. W.B.

NANA SAHIB, *nah'na sah'ib* (about 1820-about 1860), a name applied to DUNDHU PANTH, when he became leader of the Sepoys in the Indian mutiny in 1857 (see SEPOY REBELLION). He was an adopted son of the ruler of the Mahratta state of Bithur, and was educated as a Hindu nobleman, but became active in stirring up discontent upon the refusal of the British government to continue a pension which had been granted to his foster father. Upon the outbreak of the mutiny in Cawnpore he placed himself at the head of the rebels there, and though he promised to spare the British if they surrendered, he broke his word and committed such atrocities as horrified the world. After the rebellion was suppressed he fled to Nepal, and the time of his death is unknown. As a consequence of the mutiny the government of India was taken from the East India Company by act of Parliament (see INDIA, subtitle *Government and History*).

NANCY, *nahN se'*, the capital of the French department of Meurthe-et-Moselle, formerly the capital of the province of Lorraine, 220 miles east of Paris, on the railway to Strassburg. It is situated on the Meurthe River, six miles above its junction with the Moselle, and on the Eastern and Marne-Rhine canals. The first clash of the War of the Nations occurred on the Alsace-Lorraine frontier near Nancy, and the city was under bombardment a number of times in 1914 and 1915 (see WAR OF THE NATIONS).

Nancy's real importance dates from the fifteenth century, when Charles the Bold, one of the most powerful of the French vassals, was defeated by Rene II, Duke of Lorraine, and died at the city's gates. Nancy was the seat of the dukes of Lorraine until 1766, when it passed to the French, and it owes much of its architectural beauty to Stanislas Leszczynski, Duke of Lorraine and king of Poland, who made it one of the palatial cities of Europe. In 1814 and 1815 Nancy was occupied by the Allies who were fighting Napoleon; during the Franco-German War, in 1870, it was seized by the German forces, and compelled to pay a heavy ransom. The city is distinguished for its many imposing triumphal arches. Before the War of the Nations, Nancy had a population of 120,000.

NANKING', a Chinese city on the Yang-tse River, about midway between Peking and Canton, in former days one of the glories of the old Chinese Empire, of which it was the seat of government from 1368 to 1403. The name Nanking means *southern capital*. It is now the chief city and capital of the province of Kiangu-su, but derives much of its importance from its military college, arsenal and gun and ammunition factories. In the Tai-ping rebellion, which brought ruin and desolation to China between 1850 and 1864, Nanking suffered greatly. In 1853 it was captured by the rebels, who made it their capital, and it was not retaken by the government forces until 1864.

In the meantime nearly all of its historic monuments and public edifices, including its famous porcelain tower and the greater part of its magnificent encircling walls, were destroyed. The only features of historic interest that still remain are the tombs of several emperors of the Ming dynasty, on the eastern outskirts of the city. In Nanking, in 1842, was signed the first treaty between China and Great Britain. The city was the seat of government of the

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viceroy of Kiang-nan, the most powerful of all the Chinese governors under the old empire. Population, 1910, 267,000.

NANSEN, *nahn'sen,* FRIDTJOF (1861-), famed as an Arctic explorer, was born near Christiania, and educated at the university in that city. He was interested particularly in zoölogy, and his first exploring expedition, in 1882, was made in search of zoölogical specimens. Later in that year he became curator of the Natural History Museum at Bergen. In May, 1888, he set out on an expedition across the ice field of Greenland, and succeeded in crossing from the east to the west side, an achievement which many Arctic authorities had declared impossible. On his return he published *The First Crossing of Greenland* and *Eskimo Life,* this latter the result of his winter sojourn with the Eskimos of Greenland.

FRIDTJOF NANSEN
The world's most famous Arctic explorer of the latter part of the nineteenth century.

The great object toward which Nansen looked forward was a Polar expedition; he had his own theory as to the correct method for such a trip. Driftwood from Siberia, and the appearance of relics from the *Jeannette* expedition, led him to believe that a ship might be carried by the ice drift north from Siberia across the Pole and south to Greenland. He succeeded in interesting the government of Norway in his theories, and a vessel, the *Fram* ("Forward"), was fitted out for him. This was specially built to withstand the pressure of the ice floes, having sloping sides so that the ice might lift and not crush it. Later the same vessel carried Roald Amundsen into both Polar regions, and to the discovery of the South Pole.

In the *Fram* Nansen left Christiania June 24, 1893, and in September forced his way into the ice pack near the New Siberia Islands. The *Fram* drifted, suffering no damage from the ice, until March 14, 1895, when Nansen and Lieutenant Johansen left it and set out toward the Pole with sledges. The latitude which they reached on April 7, 86° 4′, was 184 miles farther north than any point before attained by man, and within 272 miles of the Pole. Returning, they reached Franz Josef Land, where they were obliged to winter, and then departed for Spitzbergen. In June, 1896, they encountered the Jackson-Harmsworth expedition, with whom they returned to Norway. Meanwhile the *Fram,* after drifting to latitude 85° 57′, had turned back, and reached Norway soon after Nansen's arrival.

The explorer was given a most enthusiastic reception, had honors showered upon him by various countries, and achieved a great popular success in his lecture tours through Europe and the United States. His *Farthest North* is a very interesting account of the expedition. Nansen played a prominent part in the separation of Norway from Sweden, and from 1906 to 1908 was minister to England from Norway. In the latter year he returned to Christiania and took up his work as professor of oceanography in the university there. See FRANKLIN, SIR JOHN. Later and more successful voyages are described under POLAR EXPLORATIONS.

Consult Nansen's *Farthest North;* Dolman's *Dr. Nansen; the Man and His Work.*

NANTES, *nahNt,* in English, *nants,* the seventh largest city of France and one of the most beautiful in the republic, is the capital of the department of Loire-Inférieure. It lies upon the right bank of the Loire, 250 miles southwest of Paris. The rise of the port of Saint Nazaire, nearer the mouth of the Loire, and the difficulty in the navigation of this river have tended to reduce the commercial importance of Nantes. However, in 1891 a ship canal uniting these two places was constructed to restore the rightful prestige of the older city. There are five miles of quays on the banks of the river, and in 1914 over $5,000,000 was spent in improving the harbor. Shipbuilding is carried on extensively, and other industries include the preparation of sardines and the manufacture of sugar, nets, sailcloth, soap and machinery.

Among the old buildings of interest are the cathedral, begun in 1434 and still unfinished; and the ducal castle where, in 1598, Henry IV signed the Edict of Nantes (see below), giving freedom of religion to the Huguenots (which see). The more recent buildings of note are the Church of Saint Nicholas, the hall of justice, a picture gallery containing works of modern French masters, a museum of natural history, and the Exchange, the latter one of the finest buildings in France.

For a long time Nantes formed one of the most valuable possessions of the dukes of Brit-

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tany, but in 1499, when Anne of Brittany married Charles VIII, it passed to the crown of France. In 1793 it was the scene of some of the most terrible massacres of the French Revolution. Between 1865 and 1870 the old town was demolished, and since then the city's natural beauties have been much improved by art and many notable new structures. Population, 1911, 170,535.

NANTES, Edict of, one of the most celebrated royal decrees in history, memorable as the first formal recognition by a great European country of the principle of religious toleration. It was signed on April 13, 1598, by King Henry IV of France, in the city of Nantes, and marked the end of a struggle between the Roman Catholics and Protestants that had long harassed the kingdom. By this decree the Huguenots (French Protestants) were given the same civil rights as the Roman Catholics, and granted liberty of conscience in religious matters, on condition that they pay tithes to the Roman Catholic Church and celebrate the Church festivals. In addition they were permitted to remain in possession of their fortified towns, among which was the city of La Rochelle. The edict remained in force until its revocation by Louis XIV in 1685. He was persuaded to this step by Madame de Maintenon.

NANTICOKE, *nan' ti kohk,* Pa., a borough in Luzerne county, situated in the northeastern part of the state, seven miles southwest of Wilkes-Barre. It is on the Susquehanna River and is served by the Pennsylvania Railroad and by electric interurban lines. Anthracite coal mines in the vicinity employ 10,000 men. Silk mills, hose factories and cigar factories are leading industrial establishments. The city has a splendid system of parks, a $200,000 high school building, a city hall and a state hospital. The settlement of Nanticoke was begun in 1850 and it was chartered as a city in 1874. The population, among whom are many Slavs, was 18,877 in 1910; it was 23,126 (Federal estimate) in 1916. The area of the borough is three square miles.

NANTUCKET, *nan tuk' et,* an island off the coast of Massachusetts, eighteen miles south of Cape Cod and sixty miles southeast of New Bedford. Its mild climate and beautiful scenery have made it a very popular summer resort, and there is frequent communication by steamer from New Bedford, Wood's Hole and Marthas Vineyard. The island, with adjacent islets, forms the county of Nantucket, Mass., with the county seat of the same name.

The chief occupations are fishing and coastwise trade; Nantucket had formerly important whale fishery interests. There is a good public library, Admiral Sir Isaac Coffin's Lancastrian School and Muskeget Park. The island was settled in 1659. The population is about 3,000.

NAPANEE, *nap a nee',* a town in Ontario, the county town of the united counties of Lennox and Addington. It lies on the Napanee River, which is navigable to the Bay of Quinte, seven miles away, and is on the Grand Trunk and Canadian Northern railways, 135 miles east of Toronto and twenty-eight miles west of Kingston. Napanee is important as a manufacturing center, its principal products being flour, brick and tiles, lumber, furniture, motor boats, carriages and cutlery. The surrounding country is a good farming district, and supplies materials for the town's creamery and cannery. Napanee has the county buildings, a collegiate institute, an armory, a park and a race track. Population in 1911, 2,807; in 1916, estimated, 4,000.

NAPHTHA, *naf' tha.* What is called naphtha in America is distinguished by the name *petroleum naphtha* elsewhere. Since ancient times the word *naphtha* has been applied to a large number of volatile (rapidly-evaporating) liquids, the first of which was a fluid form of asphalt burned in lamps by the ancient Egyptians. The word occurred in a number of the ancient languages and originally meant *moist;* it is from the same root as the name of the sea god Neptune.

Petroleum naphtha is now the most important form of naphtha throughout the world. It is the volatile part of the oil, from which gasoline, benzine and similar products may be taken by refining. Naphtha is the source of much of the illuminating gas now manufactured, and is valuable as a cleaner, as a dissolver of rubber and as a domestic fuel. See Petroleum.

NAPIER, *nape' yur,* or *na peer',* John (1550-1617), a Scotchman born in Edinburgh, famed as the inventor of logarithms, a means of shortening mathematical calculations (see Logarithms). He was one of the first great British mathematicians. Besides the system of logarithms, he invented various mechanical devices for multiplying and dividing, and extracting square and cube roots (see Calculating Machines), and he also originated a number of formulas in trigonometry. By a certain writing called the *Plaine Discovery of the Whole Revelation of Saint John,* published in 1594, he attempted to show that the Pope is antichrist.

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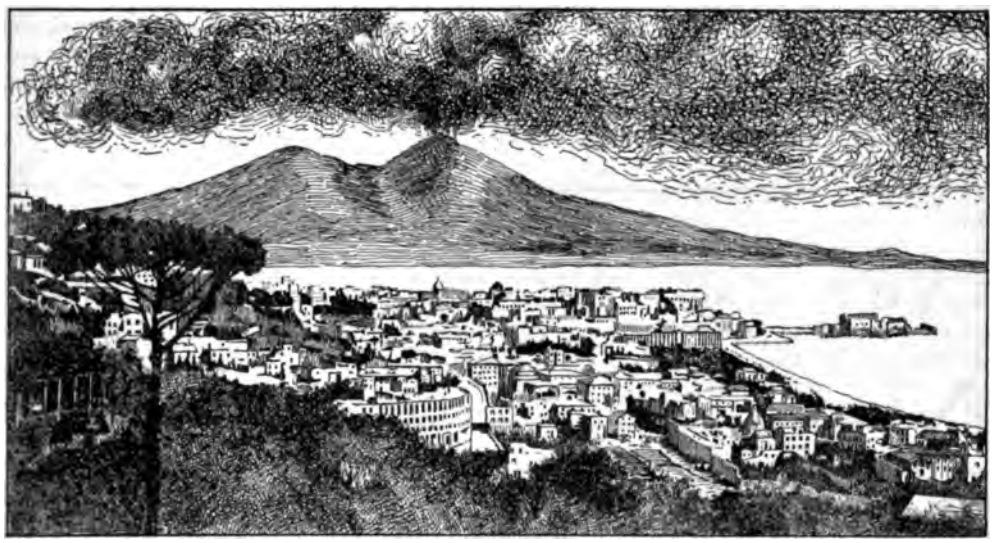
NAPLES, the largest city of Italy, with a population exceeding that of Rome by over 100,000. Naples is one of the busiest ports and manufacturing centers of the country, and is more beautifully situated than any other European city except Constantinople. It lies on the north shore of the Bay of Naples, at the foot and on the slopes of hills that, seen from the water, have the aspect of a vast amphitheater. Mount Vesuvius, forever a possible source of death and destruction, rises in solitary grandeur on the plain of Campania, ten miles to the southeast. To the south, across the bay, may be seen the lovely isle of Capri, and on the eastern shores, many little Italian villages surrounded by beautiful vineyards and groves.

Architecturally, Naples is inferior to most cities of its size, but there are many buildings of archaeological interest. The National Museum contains a priceless collection of paintings, sculptures, coins, antiquities and various objects recovered from the buried cities of Herculaneum and Pompeii. Among its sculptures are the famous *Farnese Bull* and *Farnese Hercules* (a picture of the latter is shown in connection with the article HERCULES). There are many castles reminiscent of medieval days, one of the most interesting of which is the egg-shaped Castello dell' Ovo. The so-called "New Castle" (Castello Nuovo) has a sculptured arch, used as a portal, that ranks with the best medieval architecture of Southern Italy. Of about



NAPLES, WITH VESUVIUS IN THE DISTANCE

Naples is said to be the noisiest and most densely-populated city in Europe. Here Italian life may be seen in its most sordid and its most picturesque phases. "There is material in every Neapolitan street," writes one observer, "for an entire travel story on manners and customs." The eastern section is the oldest part of the city, and the center of commercial life. Formerly its people were crowded together in unsanitary old tenements, on dirty, narrow streets, but the government has partly remedied these conditions, and the disreputable slums and many of the filthy flat buildings have disappeared. Streets have been widened, new sewerage and water systems installed, and electric car lines built. The newer western section lies along the famous Riviera di Chiaia, a beautiful drive skirting the bay for three miles.

300 churches, the Gothic cathedral, containing many fine examples of painting and statuary, is the most notable.

The city has numerous educational institutions. The University of Naples, founded in 1224 by Emperor Frederick II, has an enrolment of about 6,600 students in normal times. There are, among other institutions, an astronomical observatory, a botanical garden, a royal conservatory of music, and an aquarium (in National Park) where is carried on a scientific study of the plant and animal life of the Mediterranean. A striking characteristic of the people of Naples is their interest in theatrical amusements. In the San Carlos, one of the largest opera houses in Europe, many of the world's famous stars of grand opera have been heard. Industrially, the city is important as a

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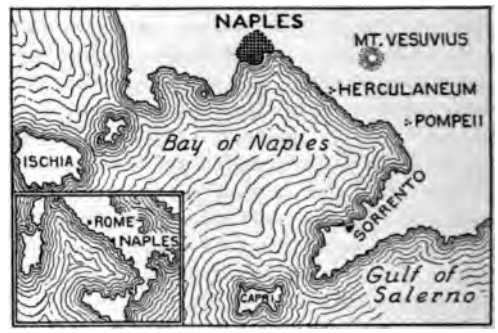
center for the manufacture of ships, locomotives, textiles, gloves, glass and machinery. Its commerce, in times of peace, is extensive, both as regards exports and imports; nearly 9,500 vessels a year entered its harbor before the outbreak of the War of the Nations.

Naples was founded by a Greek colony from Cumae several centuries before Christ. In the Middle Ages it was made the capital of the Kingdom of the Two Sicilies (see SICILIES, KINGDOM OF THE TWO). The tomb of Vergil, the ruins of the ancient cities of Herculaneum and Pompeii, destroyed by an eruption of Vesuvius in A.D. 79, and the remains of Roman temples, palaces and tombs make the surrounding region unusually interesting. The city is now the capital of the province of Naples; in 1915 its estimated population (including suburbs) was 697,917.

Bay of Naples, an inlet of the Mediterranean Sea, famous for the beautiful scenery along its shores and the deep blue color of its waters. It indents the southwest coast of Italy, and is twenty miles wide between its northwestern and southeastern points, Cape Miseno and Point Campanella. On its shores are the city



of Naples and many towns and villages, and near by towers the celebrated Mount Vesuvius. Two charming islands, Ischia and Capri, lie at the entrance of the bay.

Consult Hutton's *Naples and Southern Italy.*

NAPOLEON I (1769-1821), or NAPOLEON BONAPARTE, emperor of the French, the most dominating individuality and the greatest military genius of his day. At his frown the kings of Europe were ill at ease; against him the whole of Europe was in a perpetual state of war for nearly a score of years. In view of his remarkable career, it is surprising to learn from the French historian and critic, Taine, that Napoleon was disappointing in appearance. In height he was dwarfed by all who surrounded him, for he was only five feet one inch tall. Lowering brows accorded ill with his weak mouth; his personality lay in his eyes. He was called insignificant by those who had never looked into those eyes.

Born at Ajaccio in Corsica on August 15, 1769, he was the fourth child and second son of Carlo Maria de Buonaparte, as the name was then spelled, and Letizia Ramolino. Both his parents were of aristocratic descent. At the time of his birth the island of Corsica was passing through a troublous period, and his father had shown ability as a schemer and intriguer in following the policy most likely to benefit himself and his family. On the acquirement of the island by France, the elder Buonaparte secured a nomination for his son Napoleon to the military school of Brienne. After a few months spent in learning the French language and having already expressed his determination to become a soldier, Napoleon entered the military school at the age of ten. From Brienne, after a course of education to which he later always referred with contempt, he was transferred to the military school at Paris, where discipline was stern and education of a higher order. His scholastic career was not brilliant, and he received his commission in the artillery in 1785 without having given evidence of any marked ability, except perhaps that of holding his own counsel and of carrying through to the end any attitude adopted. These traits, which afterwards made him feared equally in the council chamber and on the battlefield, he inherited from his mother.

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On joining the artillery he was made to fulfil all the duties of a private soldier, a corporal and a sergeant before he assumed the rank given him by his commission. Setting himself to the task of thoroughly mastering the theoretical and practical details of his profession he devoted much of his time to study; his guiding motive at first appears to have been the patriotic desire of freeing Corsica from the yoke of France. Spending many months on leave of absence in Corsica, he took part in the patriotic movement of Paoli, with whom, however, he was never in full accord.

In 1792 he was again in Paris when the mob attacked the Tuileries, and he received the rank of captain. A quarrel with Paoli in Corsica in 1793 decided him to throw in his lot completely with the French revolutionary party in the island and he was forced to take refuge in France. Rejoining the army, he took part in the occupation of Marseilles by the revolutionary forces and marched against Toulon, which, strongly supported by English and Spanish troops, was a great menace to the revolutionary cause. Being practically in command of the artillery at the siege of Toulon, he won golden opinions and promotion to the rank of general of brigade. The fall of Toulon was due to the strategy, power of organization and concentration of Napoleon, and General du Teil called upon the ministers to "consecrate him to the glory of the republic."

Napoleon's military career practically began at Toulon, after which, in acknowledgment of the ability he displayed, he received the command of the army about to invade Italy. It was about the time of the siege of Toulon that he conceived the prevalent idea of all his future campaigns, that of concentration against one particular point of the enemy's line. With one point broken or weakened the army becomes a chain dependent on its weakest link. His campaigns at the head of the army in Italy were characterized by many rebuffs, which he met with fortitude. Placed under arrest, charged with disclosing the plans of campaign, his situation was almost desperate. It was a time when men were sent to death on mere suspicion and no man's life was safe. The commissioners sent by the Convention, suspicious and jealous, yet with not a shred of evidence against him, set him free in time to win a victory against the Austrians at Dego, in 1794; but Napoleon's campaign was canceled and Scherer was placed in supreme command. Even then he had faith in his destiny.

Fame at the Age of Twenty-Six. Again in Paris, poorly clad and ill fed, Napoleon waited for better fortune. The Convention was nearing its close, royalist reaction was making headway, and 30,000 National Guards were massed against the Convention, which was protected by Barras. Having seen him at Toulon, Barras nominated Napoleon as his second in command. Napoleon's great chance was at hand. He had one night in which to make preparations to defeat the mob which threatened the Convention. His activity was amazing, his resourcefulness superb. With a "whiff of grapeshot" he cleared the streets of Paris and paved his own road to power. Royalism was defeated, the Convention dying, and democracy, in the form of the Directory, rose in a night and brought into power the man who was in time to crush democracy and monarchy alike and centralize a world-power in one individual. Napoleon's "whiff of grapeshot" made October 5, 1795, a red-letter day in the history of Europe.

Marriage to Josephine. Becoming a member of the Directory, Barras interested himself in the hero of the hour, and it was at his house that Napoleon first met Josephine de Beauharnais, who at once inspired in him a romantic passion. Though penniless, Bonaparte pressed his suit, was strongly supported by Barras, and the marriage was arranged. Josephine seemed afraid of her impetuous wooer, yet carried beyond herself by his enthusiastic domination. Two days after the marriage Napoleon set out to take command of the army in Italy. Having previously drawn up a plan of campaign he submitted it to the Directory, who instructed Scherer, then in command in Italy, to carry it out. Scherer replied that if the Directory wanted that plan of campaign carried out they should send the man who drew it up to do so. His suggestion was taken. Napoleon arrived in Nice in March, 1796. Naples, Parma and Modena were forced, by operations culminating at Lodi, to sue for peace. Army after army sent by Austria was crushed; Napoleon carried the war into the enemy's country, and Austria, shorn of the Netherlands and Lombardy, accepted terms of peace at Campo Formio in 1797. Napoleon returned to Paris, a hero, in great favor with the people.

Becomes First Power in France. In days when men eyed their neighbors askance and a leader of the people was to be dreaded, the rise of Napoleon was viewed with disfavor by the Directory. The very men who promoted him now feared the power they had created. An

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opportunity to get his disturbing personality out of France was eagerly seized. Napoleon's power with the army was now enormous, the devotion of his men amounting almost to worship. To rid the country of him and at the same time to strike a blow at England, the power then most to be feared, he was dispatched to Egypt, where at first he met with

NAPOLEON BONAPARTE

his usual brilliant success. The destruction of the French fleet by Lord Nelson, at the battle of the Nile, in 1798, however, turned the tide of events, and after meeting with varying fortune Napoleon, prompted by news of the infidelity of Josephine and the intrigues of the Directory, handed over the command to Kleber and returned to Paris. By a bold stroke he abolished the power of the people who sought to crush him. The Directory ceased to exist; a new constitution was drawn up, with Napoleon as First Consul. The Corsican "corporal" was ruler of France.

It was in 1803, while First Consul, that Napoleon entered into the negotiations with the United States which culminated in the Louisiana purchase. Being in imperative need of money to carry on his wars and deciding that the dream of a western empire for France must be abandoned, the First Consul sold to the United States a vast territory covering nearly a million square miles, land which is now divided into eighteen states.

Successful Against All of Western Europe. Although his government was marked by sagacity and vigor, Napoleon's mind dwelt continually on war and conquest, and it was almost impossible for him to settle down to the arts of peaceful government. His dreams of an eastern empire had been shattered. India, which he had hoped to subdue after Egypt, was beyond his reach. Austria still occupied Northern Italy. A blow, quick and decisive, must be struck. War was his element, and on his armies depended his popularity and his power. In 1800 he conducted his famous march across the Alps, by the Great Saint Bernard Pass, into Italy. At Marengo the Austrian army was confronted, and Napoleon would have been annihilated but for the timely arrival of Desaix and Kellerman with reënforcements, which changed a rout into a victory. Austria was again defeated at Hohenlinden on December 2, 1800, and terms of peace were arranged and signed by Joseph Bonaparte at Lunéville in February, 1801.

England was then France's only remaining active enemy. France was compelled to evacuate Egypt; Malta was retaken by the English. The Treaty of Amiens, signed by Cornwallis for England and by Joseph Bonaparte, on March 27, 1802, gave France the first real peace for ten years. Spain, Naples, Bavaria, Portugal, Russia, Turkey and, finally, England, had all been forced into treaties directed by the sallow, undersized Corsican. In all these treaties were buried the seeds of future wars, carefully sown by the master mind of Napoleon, seeds that were shortly to grow like dragon's teeth into armies beneath whose tread Europe must again tremble.

Becomes Emperor. Not satisfied with the appointment of Consul for life, which had been conferred on him by an unanimous vote of the people, Napoleon began to dispense with any governmental form and power except that vested in himself, and, being offered the title of Emperor by the Senate, he was crowned as Emperor Napoleon I on December 2, 1804, in the presence of Pope Pius VII. It is said that being impatient, he snatched the crown from the Pope's hand and, placing it on his own head, ordered the Pope to proceed quickly with the ceremony.

While Napoleon's life is best known for its military side, yet he ruled the internal affairs

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of France as personally as he guided its armies. His Code Napoleon, a system of laws promulgated under his order, was a concise outline of judicial procedure. He also did much to encourage elementary education.

Begins to Dominate Europe. Napoleon, like Caesar of old, had cast longing eyes at England, and now planned its invasion. War broke out in 1803 and the Emperor prepared to put his plan into execution. Russia, Austria and Sweden uniting with Great Britain, Napoleon was forced to use his "army of invasion" to crush the continental opposition, rather than to subdue the "nation of shopkeepers," as he described the English. Mack, the Austrian general, was compelled to surrender at Ulm (1805). In the same year Napoleon entered Vienna and a month later completely routed the Russian and Austrian armies at Austerlitz, one of the most brilliant victories of his whole career. Meanwhile, Nelson, by his great victory at Trafalgar, had completely established the supremacy of England at sea.

Napoleon now set himself to order the affairs of the territories that had come into his hands. He was a believer in the theory that "The object of war is victory; of victory, conquest; and the object of conquest is occupation," and he proceeded to change the map of Europe to his liking. Britannia might rule the waves, but on land the whole of Europe bowed to the will of Napoleon, backed by his artillery. His brother, Joseph Bonaparte, was made king of Naples, another brother, Louis Bonaparte, was declared king of Holland, and districts of Germany and Italy were created into principalities and dukedoms and distributed among the emperor's favorite, or most successful, generals. This arbitrary proceeding brought about further war with Prussia. But the star of Napoleon was still in the ascendant, and the year 1806 brought more glory to France and deeper degradation to Prussia. The battles of Jena and Auerstädt opened the way to Berlin, where Napoleon as a conqueror issued the Berlin Decree, instituting the Continental System, completely isolating England.

Advancing against the Russians, he met with disaster at Poltusk and Eylau, but quickly recovering, inflicted a crushing defeat on the Russian army at Friedland, in the summer of 1807, and the czar was compelled to sue for peace. By the Peace of Tilsit Prussia received back about half her dominions, and Russia agreed to close her ports against all British trade. Jerome, the younger brother of Napoleon, was made king of Westphalia; Warsaw was created a duchy and given to the king of Saxony; whole provinces were divided and new ones created at the whim of the mighty conqueror.

Still there were other regions open to the thunder of Napoleon's armies. Portugal had not obeyed the Berlin Decree. Dispatched with a large army of invasion, Junot occupied Lisbon. The affairs of Spain were badly managed; Murat was sent to Madrid, and Charles IV was dethroned. Joseph Bonaparte was not contented with Naples. Here was the throne of Spain ready for his occupation—Murat should take Naples as his share of the plunder. So Napoleon juggled with thrones and kingdoms. Europe was outraged, but lay silent and sullen beneath the guns of the conqueror. England, recovering from her stupor, realized the menace in the figure of the emperor, looking across the narrow English Channel, waiting an opportunity to strike. Spain was in arms, and needed help to drive out the usurper. Thus began the Peninsular War, which lasted seven years. Meanwhile, Austria had again declared war and raised an army under the Archduke Charles. Napoleon encountered him. It was a case of Caesar's "I came, I saw, I conquered," over again. At Eckmühl the Austrians were routed. Himself defeated at Aspern and Eslingen, the later victory at Wagram (1809) enabled the invincible Corsican again to enter Vienna as a conqueror and dictate terms of peace.

Returning to Paris, he cruelly divorced Josephine, who had borne him no children, and soon afterwards married the Archduchess Maria Louise of Austria, who bore him one son. The principal object of Napoleon was now to crush the disturbance in Spain, and to this he devoted the chief power of his mighty armies. Only in the Peninsula was England directly responsible for operations against Napoleon, but Britain liberally subsidized other movements and its ships seized French colonies wherever possible. In the Peninsula the armies of France were meeting with reverses, and were slowly, but surely, driven out of the country.

Disaster in Russia. Russia had been unable literally to carry out the behests of the Berlin Decree. In 1812 Napoleon declared war and invaded Russia with an army of nearly 600,000 men. The Russians had learned wisdom, and would not face the invaders. Retiring step by step, laying waste the country as they went, they led the French into the interior. At Boro-

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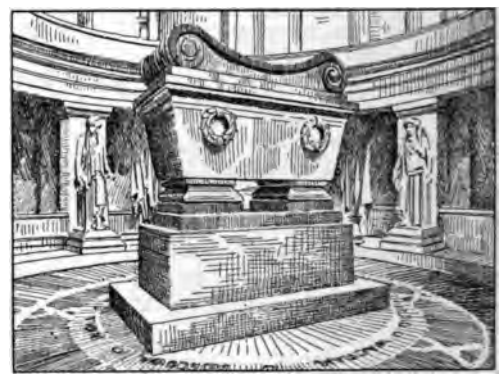
dino and elsewhere the avalanche of French overwhelmed Russian resistance. Napoleon pushed on to Moscow, only to find the city in

flames and behind him a country utterly devastated. It has been claimed that the weary march back began the breaking up of that mighty intellect which had ruled Europe so long. What war could not do to the army of



THE TOMB AND COFFIN OF NAPOLEON

the "Little Corporal" the piercing cold and famine on the plains of Russia accomplished. Swarms of Cossacks hung like jackals on their flanks; the weakened veterans, heroes of numberless battles, succumbed to cold and disease, and of that gallant army of 600,000 only about 25,000 left the country. It was the beginning of the end for Napoleon. Leaving Murat in command, he hastened to Paris to organize a fresh army before the news of his terrible disaster reached Western Europe. But his prestige was gone. England and Russia at once assumed the direction of the destinies of Europe.

Coalition Against France. Prussia, Russia, Sweden and Spain were roused and joined Great Britain against Napoleon. The allies were defeated at Lützen, Bautzen and Dresden, but the allies were able to reënforce their armies, while Napoleon was fighting with the total remnant of his strength. Disaster overtook him at Leipzig and in the "Battle of the Nations," October, 1813, he was completely defeated. Raising with herculean efforts a new army, he confronted the allied hosts from January to March, 1814. The Duke of Wellington was advancing on Paris from the south. Napoleon was outnumbered; his prestige was gone; his trusted veterans had been left amid Russian snows; he had but an army of recruits to depend on.

Elba, Waterloo, then Saint Helena. In April, 1814, Napoleon abdicated. With the title of emperor and six million francs, he retired to the island of Elba and Europe breathed freely —only for ten months, however. Escaping from Elba, Napoleon, everywhere joined by old followers, made a triumphal entry into Paris, and the allied armies once more took the field against him. On June 16, 1815, he defeated Blücher at Ligny, while Marshal Ney, who had joined him after declaring he ought to be kept in an iron cage, fought the British at Quatre Bras, under Wellington, who fell back on Waterloo. On June 18, he was attacked at Waterloo by Napoleon, whose army was totally defeated in the most historic battle of modern times. Fleeing to Paris, Napoleon again abdicated and tried to escape from France. Failing in this, he surrendered to the captain of a British man-of-war, who conveyed him to England, nominally a guest, in reality a prisoner. He was then conveyed to Saint Helena, a forbidding, desolate island in the Atlantic, off the

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west coast of Africa. All the world feared to have him free. In solitude, under the care of a stern, harsh British governor, he spent the remainder of his days. He died a victim of cancer on May 5, 1821, was buried in the island, but in 1840 his remains were disinterred and conveyed to Paris. They now repose beneath the dome of the Hotel des Invalides, here illustrated. F.ST.A.

Consult Carlyle's *French Revolution*, for dramatic setting prior to Napoleon's ascendancy; Rose's *Life of Napoleon I*; Fournier's *Napoleon I, a Biography*; Macaulay's *History of England*, so far as it relates to the Napoleonic era.

Related Subjects. The following articles in these volumes will give added information on the subject of Napoleon and will make clear certain references in the above article:

Austerlitz	Louisiana Purchase
Barras, Count de	Lützen, Battles of
Bonaparte, with numerous subheads	Marengo, Battle of
	Maria Louisa
Code Napoleon	Murat, Joachim
Continental System	Nelson, Horatio, Viscount
Corsica	
Directory	Reichstadt, Duke of
Elba	Saint Helena
France, subtitle *History*	Trafalgar
French Revolution	Tuileries
Jena	Waterloo, Battle of
Josephine, Marie Rose	Wellington, Duke of
Leipzig, Battles of	

NAPOLEON II, the only son of Napoleon Bonaparte. See REICHSTADT, NAPOLEON FRANÇOIS JOSEPH BONAPARTE, Duke of.

NAPOLEON III, CHARLES LOUIS NAPOLEON BONAPARTE (1808-1873), emperor of the French in 1852, and nephew of the great Napoleon I. His father was Louis Bonaparte, king of Holland, his mother Hortense, daughter of Napoleon's wife, Josephine Beaucharnais, and he was born in Paris, April 20, 1808. His youth, after the overthrow of Napoleon in 1815, was spent with his mother in exile, but the greatness of the Bonaparte family was kept ever before him, and from the time he was twelve years old he seems to have had dreams of empire. A thoughtful, serious boy, he made excellent progress in his studies, and might have been content to become a scholar and man of letters had he not felt that the tradition of his house demanded more of him. When the Duke of Reichstadt, Napoleon's son, died in 1832, Louis Napoleon felt more certain than ever of his destiny, and began to lay plans to achieve it. Still compelled by Louis Philippe to live in exile, he wrote books and articles on various subjects and so kept his name before the people.

In 1836 he became convinced that the government of Louis Philippe was weak and unpopular, and attempted to stir up the garrison at Strassburg to revolt and support his claims. The result was a ludicrous failure, and he was sent to America, without being subjected to trial. On his return in the next year he went to live in London, but kept in close touch with affairs in France, and in 1840 made another attempt against Louis Philippe. This time he was sentenced to life imprisonment, but escaped, not at all discouraged in his ambition. When the Revolution of 1848 broke out he returned to France, but was compelled by the distrust of the provisional government to leave the country. Later in the same year he returned, having been elected to the National Assembly by five departments, and in December was elected its President. For a time the President and the Assembly seemed to work in harmony, but mutual distrust arose, and in December, 1851, Louis Napoleon ended the contest in his own favor by a sudden show of military force. Elected President of the republic for ten years by an overwhelming majority, he forced the people to concur the next year in the change from republic to empire, and he himself saw his dreams realized when he was crowned as Napoleon III. In the next year he married Eugénie-Marie de Montijo, the marriage being prompted by affection rather than by ambition.

But France had not the same position before the world which it had had in the days of the first emperor, and Napoleon III set about regaining it. France took, therefore, a leading part in the Crimean War, as the ally of England and Turkey against Russia, and espoused the cause of Italy in the struggle against Austria. Napoleon led the French armies and though he proved to be no general, had a share in the victories of Magenta and Solferino. The treaty which he concluded at Villafranca with Austria was selfish, in that it neglected the interests of Italy and considered only France, which received the provinces of Nice and Savoy.

Napoleon next attempted to set up a "Latin and Catholic" empire in Mexico by placing the Archduke Maximilian on the throne of that country, but the result was utter failure. After the Seven Weeks' War between Prussia and Austria he began to look upon Prussia as the natural enemy of France and to look forward to a contest between the two countries. Actual war broke out in 1870, and Napoleon led the

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French forces, but was captured at Sedan on September 2 and subjected to imprisonment in Germany. His wife and son fled to England, and there, after peace had been declared in 1871, Napoleon was allowed to join them. His death occurred at Chislehurst, in Kent. A.MC C.

Consult Simpson's *Rise of Louis Napoleon;* Barthez's *Empress Eugenie and Her Circle.*

Related Subjects. The reader is referred to the following articles in these volumes:

Bonaparte, subhead	France, subtitle *History*
Louis Bonaparte	Franco-German War
Crimea, subhead	Louis Philippe
Crimean War	Napoleon I
Eugénie-Marie de Montijo	Sedan, Battle of

NARCISSUS, *nar sis' us,* a character in Greek mythology, son of Cephissus, the river god, and Leiriope, a nymph. Narcissus was a handsome

In some delicious ramble, he had found
A little space, with trees and rocks around;
And in the midst of all, a clear, deep pool.
KEATS.

lad, very vain of his own beauty, and indifferent to beauty in others. Echo, a nymph, and a favorite of the gods, was so wounded by his rejection of her love that she faded away until only her beautiful voice remained. The gods, angered by Narcissus' coldness and Echo's death, caused him to fall hopelessly in love with his own image, mirrored in a spring. Fascinated by his own face, he bent unceasingly over the spring until he, too, died and was changed by the gods into the flower that bears his name.

NARCISSUS, a large group of popular early spring flowers which send up their lovely blossoms from brown-coated bulbs. This group includes the dainty yellow jonquil, the gay, golden daffodils and the lovely white narcissus. Nearly all are natives of Europe, but for their hardiness, sweet fragrance and delicately fashioned blossoms of yellow or white have been widely cultivated indoors and out. The jonquil and daffodil are described under their titles in these volumes.

Of the narcissi, the *poet's narcissus,* or *pheasant's eye,* is a hardy favorite. It produces a single fragrant, wide-open blossom on each stalk. White petals surround a very short, yellowish tube which has a crinkled red edge. It is said this is the species immortalized by classical writers of long ago. The *paper white narcissus* and the *polyanthus narcissus,* or *Chinese sacred lily,* with their deliciously fragrant blossoms of pure white, appearing in clusters of from four to twelve amid narrow, flat green leaves, are general favorites for winter cultivation in hothouses. If bulbs are planted outdoors in autumn, three to four inches deep, in loose, good soil, masses of fragrant blossoms will appear in May.

PAPER NARCISSUS
Flower and bulb.

The name is from the Greek word meaning *numbness,* or *torpor,* and was suggested by the reputed sleep-giving qualities of the perfume of the blossoms.

NARCOTIC, *nahr kot' ik.* There are certain substances that have a marked effect upon the nervous system, producing insensibility to pain, stupor, sleep or coma, according to the dose. Such substances are called *narcotics,* a term derived from a Greek word meaning *to make numb.* Opium, the effects of which are de-

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scribed under that title, is one of the narcotics most commonly used; others are Indian hemp (hashish), belladonna, hyoscyamus (the leaves of henbane), chloral, cocaine, tobacco, alcohol (in strong doses) and certain drugs derived from coal tar (which see). When a narcotic is given in sufficient quantity to cause sleep or coma, it is called a *hypnotic;* the term *anodyne* signifies a drug that relieves pain by benumbing the nerves. It will be seen, therefore, that a narcotic may be both an anodyne and a hypnotic. In a sense the general anesthetics, ether and chloroform, are narcotics, but their effects do not last so long as those of true narcotics.

In medicine narcotic drugs have a place of wide usefulness, but they also have very dangerous possibilities. Too large doses may cause not only insensibility, but death. The indiscriminate use of opium and its derivatives to relieve pain has caused in numerous instances the formation of a terrible drug habit. For these reasons no one should ever resort to the use of these drugs except under the direction of a physician who is thoroughly reliable. State, provincial and national governments are now protecting the public by enforcing stringent laws regarding the distribution and use of narcotics.

Related Subjects. The reader is referred to the following articles in these volumes:

Belladonna	Hashish
Chloral	Morphine
Cigarette	Opium
Cocaine	Tobacco

NARRAGANSETT, *nair a gan' set,* a powerful tribe of Indians who lived in colonial times in what is now Rhode Island, west of Narragansett Bay. This tribe, belonging to the Algonquians, numbered several thousand when first known to New England settlers. They made friends with Roger Williams, but in 1675 joined the armies of King Philip, the son of Massasoit. In a great battle in a swamp near Kingston, R. I., nearly one thousand Narragansetts were killed, and the rest of the tribe were later scattered among Indians of the North and West. The few who survive are not pure-blooded Narragansetts.

NARRAGANSETT BAY, an inlet of the Atlantic Ocean extending into the State of Rhode Island about twenty-eight miles. By reason of its long and indented shore line it greatly enhances the commercial advantages and transportation facilities of the state. Newport, until 1900 one of the capitals of Rhode Island, and America's most famous summer resort, is situated on an island in the bay, five miles from the Atlantic Ocean. Providence, the official capital of the state, is on the western shore of the bay at the head of navigation. At its entrance, from Sakonnet Point to Point Judith, Narragansett Bay is about eighteen miles wide. Its largest island is Rhode Island; others are Conanicut, Prudence and Hog.

NARVAEZ, *nahr vah' aith,* PANFILO DE (1470?-1528), a Spanish soldier and adventurer who is best remembered for his attempt to explore what is now Florida. He was born in Valladolid, sailed to America in 1498 and took part in the conquest of Cuba under Velásquez. In 1527 he led an independent exploring expedition and reached the west coast of Florida, landing, it is supposed, at Tampa Bay with five ships and about 600 men (April, 1528). He marched inland, but lost half of his men in encounters with the Indians, and when after desperate struggles he reached the coast, he was unable to find his ships. Rude boats were built, in which Narvaez and about 240 survivors embarked for a voyage along the western coast. Driven out to sea in a storm, he and all his men perished, with the exception of four. These finally reached Mexico after wandering about for several years.

NARWHAL, *nahr' wal,* a large mammal found in the northern seas, of great value to the Eskimo as a source of food, weapons and tools. The narwhal belongs to the family of whales and is frequently called the *sea unicorn,* because of a long spiral ivory tusk growing out of the left side of the head of the male, which probably constitutes a very effective weapon of attack and defense. In some cases there are two of these tusks, each of which is the outgrowth of a tooth in the upper jaw. Otherwise these animals are toothless. The length of the narwhal is from twelve to fifteen feet, the tusk being from six to ten feet in length. The body color is dark gray above and white below, with darker patches on the sides. The head is short and rounded and there is no dorsal fin. These animals feed on fish and mollusks. The narwhal and seal are the mainstay of the Greenlanders, and the capture of a narwhal is an interesting event, as oil is obtained from the blubber, and the skins and ivory are made into tools and other useful articles.

NASBY, *naz' bi,* PETROLEUM V. See LOCKE, DAVID R.

NASEBY, *nayz' bi,* BATTLE OF, the English battle which decided the issue of the first war

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between Charles I and Parliament. The conflict took place on June 14, 1645, in the parish of Naseby, in Northamptonshire. The Parliamentary army was commanded by Cromwell and Sir Thomas Fairfax. Cromwell attacked the enemy's center, Fairfax pressed it from the front, and gradually the Royalist infantry separated into small groups which surrendered one after another. The spoils included a hundred standards and colors and the private papers of the king. This battle meant practically the complete annihilation of the last field army of Charles I.

NASHUA, *nash'u a,* N. H., a manufacturing center in Hillsborough County, situated in the southeastern corner of the state, eighteen miles south of Manchester and forty miles northwest of Boston. It is on the Nashua River near its entrance into the Merrimac River, and is served by several branches of the Boston & Maine Railroad and by electric interurban lines. Forty per cent of the population are French. In 1910 the population was 26,005; in 1916 it was 27,327 (Federal estimate).

Prominent features of the city are the Federal building, a United States fish hatchery, public library, Y. M. C. A. building, the Church of Saint Francis Xavier and Greeley Park (165 acres). The principal institutions are the Memorial and Saint Joseph's hospitals, the Hunt Home and Nashua Sanitarium. Power for manufacture is supplied by a three-mile canal extending from the Nashua River. The chief industrial establishments are cotton mills and manufactories of shoes, cards and gummed paper, asbestos, ice-cream freezers, refrigerators, furniture, hardware and saddlery. The city is the trading center of the surrounding agricultural country.

Nashua was settled in 1655 and in 1673 was incorporated by Massachusetts as the township of Dunstable. The latter was reincorporated by New Hampshire in 1746. The present name was adopted in 1836, and the place became a city in 1853. The commission form of government was adopted in 1913.

NASHVILLE, Tenn., the capital of the state and the county seat of Davidson County, in population ranking next to Memphis among the cities of Tennessee. It is on the Cumberland River, mainly on the left bank, and on the Louisville & Nashville, the Nashville, Chattanooga & Saint Louis and the Tennessee Central railroads, and has electric interurban and steamboat service. Its location is central in the state, 186 miles south and west of Louisville, Ky., and 233 miles northeast of Memphis. In 1910 the population was 110,364; in 1916 it was 117,057 (Federal estimate). Nashville has an area of about eighteen square miles and is situated on gently-sloping and hilly land which rises gradually westward from the river to an elevation of 560 feet. It is surrounded by the blue grass country, a fertile and picturesque section. The streets of the city are wide, and many of them are lined by beautiful old colonial homes.

Public Buildings and Parks. The principal building is the State House, situated on a hilltop in the center of the city, and constructed at a cost of $1,500,000. The surrounding grounds contain an equestrian statue of Andrew Jackson and the tomb of James K. Polk. Other noteworthy structures are the Federal building, which, with an addition, has cost $1,500,000; the courthouse, city hall and union station. In Centennial Park (the grounds of the Tennessee Exposition of 1897, which commemorated the admission of the state to the Union) stand the Parthenon and the History Building of the exposition, which was modeled after the Erectheum, and contains a museum and art gallery.

Nashville has many attractive parks, among them Glendale Park, south of the city, a place of great beauty; Cumberland Driving Park, Shelby and Watkins parks and the state fair grounds. In the national cemetery north of the town are the graves of 16,643 soldiers, among them 4,711 of the "unknown dead." In Mount Olivet Cemetery is a beautiful Confederate soldiers' monument; also the graves of 2,000 Confederate soldiers are here.

Institutions. Nashville is one of the chief educational cities of the South. Among its schools of importance are Vanderbilt University (which see); Peabody College for Teachers; the medical and dental departments of the University of Tennessee; Knapp School of Farm Life (which see); Fisk University for colored students (which see); Meharry Medical College (colored); Walden University (Methodist Episcopal) (colored); Roger Williams University (Baptist) (colored); Boscobel College, for women (Baptist); Ward-Belmont College, for women (Presbyterian); Saint Cecilia Academy, for women (Roman Catholic); and Buford College for Women.

The state library contains 40,000 volumes; the Carnegie Library building, a fine structure costing $100,000, contains 94,000 volumes. Watkins Institute has the Howard Library of 10,000 volumes, and valuable collections, manu-

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scripts, portraits, etc., of the Tennessee Historical Society. Other prominent institutions of the city include the Galloway Memorial Hospital, Saint Thomas's Hospital, the Tennessee Industrial School, the Tennessee Reformatory for Boys, the Tennessee School for the Blind, the Confederate Soldiers' Home, the state penitentiary, and six miles from the city, the state asylum for the insane.

Industries. Nashville is one of the ten chief flour-milling centers and one of the greatest hardwood markets in the United States. Its rank among industrial cities in the state is second; annual value of manufactured goods exceeds $45,000,000. Flour mill and gristmill products and lumber and woodworking products are the principal articles of manufacture. Among other articles manufactured are stoves, tobacco and snuff, cigars, fertilizers, boots and shoes, clothing, pottery and automobiles. In the city are the large publishing houses of various religious organizations. There are important wholesale interests in groceries, dry goods, boots and shoes and drugs, and the city has an extensive trade in cotton, lumber, grain, fruit, vegetables and manufactured goods.

History. The city was settled in 1870 by a band of pioneers led by James Robertson, and until 1784, when it was incorporated under its present name, was called Nashborough, in honor of Governor Abner Nash of North Carolina. It was constantly harassed by Cherokee and other tribes of Indians during its early history. In 1806 it was chartered as a city; from 1812 to 1815 it was the seat of the state legislature; and in 1843 became the permanent state capital. In 1862, during the War of Secession, Nashville, which had been occupied by Confederate troops, was captured by the Federals, and in 1864 was the scene of one of the severest battles of the war. On March 22, 1916, a great fire caused a property loss of $1,500,000. Nashville has been the home of many prominent men, among whom are Andrew Jackson, James K. Polk, General Sam Houston and Thomas H. Benton. *The Hermitage,* Jackson's old home, is ten miles east of the city. The commission form of government was adopted in 1913. The waterworks and street electric-light plant are owned by the municipality. M.W.

Consult *Historic Towns of the Southern States,* edited by Powell.

NASMYTH, *na'smith,* JAMES (1808-1890), who invented the steam hammer with which his name is everywhere associated, was born in Edinburgh, Scotland. The invention of the steam hammer was actually made in 1839, and although claims have been put forward in favor of a hammer found in Schneider's Creuzot works, it is conceded that Nasmyth deserves the full credit of the invention. The trend of his genius was manifest at an early age, and he soon became proficient in the use of mechanical tools.

His genius did not hamper his business career, his character combining a love of his work and sound business methods. So successful was he that in 1856 he retired with an ample fortune. Many improvements in machinery are due to the ingenuity of Nasmyth, while he invented many entirely new appliances, among which were a planing machine, a nut-shaping machine, a steam pile driver and various hydraulic machines. Nasmyth's principal recreation and amusement after retiring from business life was the study of astronomy. He died in London.

NAST, THOMAS (1840-1902), an American caricaturist who won his greatest triumphs through his political caricatures dating from 1871 to 1873, when he was influential in breaking up the notorious Tweed "ring" of New York City. He was the originator of the "Tammany tiger," the "Republican elephant" and the "Democratic donkey," political symbols that are still current. Nast was born in Bavaria and was brought to America when six years of age. At the age of fourteen he was employed as draftsman on *Frank Leslie's Illustrated Newspaper,* and later made sketches for papers in New York, London and Paris, during the Italian war of liberation. As a member of the staff of *Harper's Weekly,* however, he did his best work. In addition to his caricatures, he also did creditable work in oil, notably scenes from the War of Secession. For many years he published *Nast's Almanac,* illuminating the text of various authors with his own strong illustrations.

NASTURTIUM, *nas tur'shum,* a genus of South American plants, one species of which is a favorite in American gardens. This is the trailing or climbing nasturtium, whose brightly-colored blossoms of varying shades of yellow, orange or red are so effective in flower beds and borders. Some flower gardens are planted to dwarf varieties of this species. The nasturtium flower has a very interesting structure. There are five sepals, the three upper ones being so joined as to form a long spur which holds the nectar. There are likewise five petals; the three lower ones are somewhat away from the

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two upper and grow on long, fringed claws. The leaves are almost round, and as they grow close together, even overlapping one another a little, they form a dainty green retreat for the flowers. The plant has a pungent juice and the flowers and leaves are sometimes used in making salads, while the green seed pods are pickled in vinegar and eaten as a substitute for capers (see CAPER).

NASTURTIUMS

The nasturtium thrives best in a light, rich soil, with an abundance of light and sunshine. In temperate climates the seed is sown early in April.

NATAL, *na tahl'*, a colonial possession of Great Britain, one of the four original provinces of the Union of South Africa (which see). It is situated on the southeastern coast of Africa, northeast of Cape Colony and south of the Transvaal, with the Drakensberg Mountains on its western border. The Buffalo and Tugela rivers were formerly the northeastern boundary, but by the annexation of Zululand in 1897 and the districts of Vryheid, Utrecht and part of Wakkerstroom in 1903, the territory has been extended to the borders of Portuguese East Africa and Swaziland; the total area is estimated at 35,019 square miles, nearly three-fourths the area of England. The climate is healthful and the soil is fertile, producing vigorous vegetation, and timber trees grow in abundance. Grain and vegetables of all descriptions, sugar cane, tobacco and a variety of tropical fruits have been extensively cultivated, but the principal crop everywhere is maize, two crops being produced annually.

The settlement of Natal by the whites has tended to exterminate most of the larger animals native to the country, but the hippopotamus still frequents the streams, and leopards, hyenas, tiger cats and panthers are numerous in the forests and jungles. The products of rich gold fields, extensive coal mines and large sugar cane districts, with wool, form the chief exports, the last named being by far the largest. The longest tunnel in South Africa has been bored in this district, and the colony has over 1,050 miles of railway and good telephone and telegraph facilities. The only good port and the largest town is Durban, or Port Natal. The population in 1911 was estimated at 1,194,043, of whom about four-fifths were natives of South Africa, mainly Zulu-Kaffirs; the Europeans number between 75,000 and 100,000, and the East Indians and other Asiatics about 133,000.

Vasco da Gama landed at Port Natal in 1497 on Christmas Day, sometimes called the "Feast of the Nativity," hence the name "Natal." The Boers of Cape Colony, who emigrated to escape British rule, organized the Republic of Natal in 1839, but in 1843 the British annexed the country to Cape Colony, and it was erected into a separate colony in 1856. It suffered severely in the South African War (see SOUTH AFRICAN WAR). Since 1910 Natal has been under an administrator who is appointed by the Governor-General in Council and indirectly represents the king. The city of Pietermaritzburg is the capital. J.S.C.

Consult Russell's *Natal: The Land and Its Story.*

NATCHEZ, MISS., the county seat of Adams County and a noted shipping point for cotton, many thousands of bales being shipped from this point annually. It is on the southwestern border of the state and on the Mississippi River about 100 miles southwest of Jackson, the state capital. Railway service is provided by the Yazoo & Mississippi Valley, the Natchez & Southern, the Saint Louis, Iron Mountain & Southern and the Mississippi Central railways, and there is steamer communication with all Mississippi River ports. In 1910 the population was 11,791. The area is three square miles. Natchez is built for the most part on a bluff which rises about 150 feet above the river, and from this elevation a magnificent view is had of the surrounding fertile country. Here also are the elegant residences and public buildings, the lower narrow strip along the river front being largely used for shipping.

The county courthouse, the city administration buildings and Institute Hall are noteworthy buildings. Natchez has the Fisk Library, Agnes Z. Carpenter Public Library, Natchez Institute and Jefferson Military College. Features of interest are Memorial Park; the old estate of *Monmouth,* the home of General Quitman; *The Briars,* the girlhood home of Varina Howell, who was the wife of Jefferson Davis; *Somerset* and *Oakland,* the possessions of the Chotard family; and a national cemetery just outside the city limits. The industrial

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prosperity of Natchez is largely dependent on cotton. There are cotton mills, a cotton compress and cottonseed oil mills, the first cottonseed oil mill in the United States having been built here in 1834. Besides cotton, considerable rice, sugar cane and produce are shipped.

The site was occupied by the Natchez Indians, for whom the place was named, when Le Moyne de Bienville built Fort Rosalie there in 1769. In 1729 the village was almost totally destroyed and nearly all of the inhabitants were massacred by the Indians. The English took the place in 1763 and renamed it Fort Parmure. In 1779 it was taken by the Spanish, who held it until 1798, when United States troops took possession. In 1802 it became the capital of the Natchez District and Mississippi Territory, in 1803 it was incorporated as a city, and from 1817 to 1821 it was the state capital. A tornado swept the city in May, 1840, causing considerable damage. The year after its bombardment in the War of Secession (1862) it was taken by the Federals, who occupied it until the end of the war.

NATICK, *na'tik,* MASS., a town in Middlesex County in the eastern part of the state and on the Charles River, seventeen miles southwest of Boston. Transportation is provided by the Boston & Albany Railway and by electric lines. Natick is largely interested in the manufacture of boots, shoes, baseballs, shirts, clothing, boxes and saws. Besides the public schools, the town has Walnut Hill School, for young ladies, the Bacon Public Library and the Morse Institute, containing a public library and reading room. Features of interest are a monument to John Eliot and a soldiers' monument. Lake Cochituate, one of the sources of Boston's water supply, is in the northwest part of the town; one of the parks has a bathing beach. The people show with pride the shoe shop where Henry Wilson, who was later chosen Vice-President of the United States (1872), worked as a cobbler. Natick was organized as a home for converted Indians by John Eliot in 1651; their old burial ground is an attractive feature of the place. The town was incorporated in 1781. Its population in 1910 was 9,866; in 1916 it was 10,102 (Federal estimate).

NATIONAL ACADEMY OF DESIGN, an institution founded in New York City in 1826, the schools of which are open from October to the middle of May. Instruction is given in a variety of art subjects, including life, still life, antique painting, anatomy, etching, composition and coin and medal engraving, and prizes are awarded for meritorious work at annual exhibitions. The Academy has an average enrolment of from 200 to 300 students. The institution was affiliated with the Metropolitan Museum of Art and with Columbia University in 1906, and in the same year it effected a union with the Society of American Artists.

In 1802 an Academy of Arts was organized in New York, but the famous historical painter, John Trumbull, was the only recognized artist among its members. A new society was formed in 1826, called the New York Drawing Association, and two years later the name *National Academy of Design* was adopted. Prof. S. F. B. Morse, the inventor of the telegraph, was an influential member and twice served as president. At the present time the governing body of the academy is a council composed of its officers and six members.

NATIONAL ACADEMY OF SCIENCES, an organization incorporated by act of Congress on March 3, 1863. When called upon to do so by any department of the United States government, the Academy makes experiments, conducts investigations, reports on any specified subject of science or art and answers any questions submitted to it; the expenses are defrayed from appropriations made for the purpose. The Academy holds in Washington, D. C., a stated session each year, beginning on the third Monday in April, and an autumn meeting is also held at such time and place as the council determines. Special meetings may also be called when occasion demands it. The original membership was limited to fifty, but there are now about 142 honorary members and forty-one foreign associates. The former must be citizens of the United States. Each year there are published *Proceedings* of the meetings.

NATIONAL CIVIC FEDERATION, a joint organization of the representatives of capital and labor in the United States, whose object is the lessening of industrial strife. The federation has from the first emphasized the importance of arbitration, and has furnished a sort of forum for the discussion of the grievances of labor and of desirable legislation. Separate departments devote their attention to such problems as immigration, wages, the open and closed shop, strikes, lockouts, trade agreements and so on. A welfare department concerns itself with bettering the living condition of the worker.

The organization came into being in New York City in 1900, following a series of conferences held there and in Chicago. Many of the

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most eminent men in the country interested themselves in the project, and it included in its membership such men as Grover Cleveland, Charles W. Eliot and Archbishop Ireland, besides large employers of labor, like John D. Rockefeller, and labor leaders, like Samuel Gompers and John Mitchell. While the influence which the organization has been able to exert has hardly justified the most optimistic hopes of its founders, the federation has undoubtedly played its part in producing a better understanding between capital and labor.

NATIONAL CONGRESS OF MOTHERS AND PARENT-TEACHER ASSOCIATIONS. With the earnest purpose of promoting better opportunities for all children a group of persons met in Washington February 17, 1897. Mothers, fathers, educators, clergymen and statesmen were there, but the central figures of that great Congress were Mrs. Theodore W. Birney and Mrs. Phoebe A. Hearst, both of them mothers, and both women of broad outlook on social conditions and needs. Both had reached the conclusion that the foundation of civic and social betterment could be reached by more intelligent, comprehensive care of children. It was the first time in history that mothers of a nation had been called together to consider their own responsibilities as mothers and the relation of the home to civic and social life.

The objects of the National Congress of Mothers and Parent-Teacher Associations then organized and incorporated were thus stated in the constitution:

> The objects of this Congress shall be to raise the standards of home life; to give young people opportunities to learn how to care for children, so that when they assume the duties of parenthood they may have some conception of the methods which will best develop the physical, intellectual and spiritual nature of the child; to bring into closer relations the home and the school, that parents and teachers may coöperate intelligently in the education of the child; to surround the childhood of the whole world with that wise, loving care in the impressionable years of life that will develop good citizens; to use systematic and earnest effort to this end through the formation of Parent-Teacher Associations in every public school and elsewhere, through the establishment of kindergartens, and through distribution of literature which will be of practical use to parents in the problems of home life; to secure more adequate laws for the care of blameless and dependent children, and to carry the mother love and mother thought into all that concerns childhood. The Congress believes that, with the aid of Divine Power, these objects will be accomplished.

First of all, the Congress placed emphasis on home life, for every child comes into some kind of a home, and the influences for good or evil are never forgotten. The Congress set for its primary work the raising of the standards of every home to best fit the requirements of infancy, childhood and youth. That meant education of parents in child nurture, in all that conduces to the best kind of a home. It meant reaching every home with the knowledge which is essential in good home making. The Congress saw children suffering from parental ignorance concerning health, foods, physical, mental and spiritual growth and methods which best promote each. It saw parents craving more light, but with no means offered for satisfying the craving. It assumed the task of supplying this need of parents and children.

The Congress saw teachers who were sharing with parents the guidance of children, yet since neither was in communication with the other, the task of both parents and teachers was made the more difficult, and the children suffered by this lack of mutual understanding and coöperation.

The Congress saw the majority of children coming under school jurisdiction, and through the well-systematized school system it discerned the way to open the opportunity for home education to parents, and at the same time secure intelligent coöperation of home and school through the establishment of a Parent-Teacher Association in connection with every school.

The National Congress of Mothers assumed the work of organizing these associations, and it also assumed the permanent function of the educational direction of the home education work of all these associations, which would make them of real value to parents wherever they might be, insure their continuance and keep them true to their fundamental, far-reaching purpose. The Congress saw what to the mother heart seemed gross neglect of dependent, orphan and erring children. It saw children in prisons and jails in every state; it saw children associated with criminals in all court procedure; it saw no discrimination between the offenses of children and adults and no adequate provision for helping them. To put mother love and mother thought into the solution of these conditions and to ask Divine guidance in the great work of guarding and guiding little children was one of the objects to which the Congress pledged itself.

Comparatively little attention had been given to protecting legislation for all phases of child welfare before 1897. In changing this condition the National Congress of Mothers has wielded

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a mighty influence. The Congress did not originate the juvenile court and probation system, but it saw its advantages and worked for years to establish the juvenile court and probation system throughout this and other lands, conducting a systematic propaganda which was successful in many places. Then, by practical experience of mothers in the juvenile court, detention houses in the place of jails were promoted, and the placing of the probation work on a foundation which required a knowledge of child nurture as a qualification for such service became a feature of the Congress work.

The breaking up of families through poverty or death or desertion of one parent next engaged the consideration of the Congress, and the movement for the mothers' pension was inaugurated and has been promoted with ever-increasing success. This has won the support of many thinking men and women, and also judges and legislatures, and to the Congress is due the enactment of a pension law in some states, while in all states the Congress has given its support to the pension movement. Its advantages in economy and efficiency have already been proved.

There was no child-labor committee in existence when the National Congress of Mothers inaugurated the movement to regulate the employment of children in mines and factories.

The Congress has urged that a Department of Child Hygiene in every board of health be established, the primary work being saving babies by education of mothers in infant hygiene. It also has urged that a child welfare department in city and state be appointed to study all conditions affecting childhood, to report to governor and legislature, with a view of perfecting the protection and development of children.

The National Congress of Mothers and Parent-Teacher Associations secured the extension of the educational work of the National Bureau of Education and is responsible for the first recognition of parents as educators. The Home Education Division was opened in the Bureau of Education in September, 1913. Children's education begins at birth, and parents have eight times the educational work that is given to teachers. To help the home to give intelligent care and guidance to children is the work of the Home Education Division.

Through the Home Education Division of the Bureau of Education, which is supported almost wholly by the National Congress of Mothers and Parent-Teacher Associations, three distinct types of work are being done:

1. The Bureau is promoting in a very effective way the organization of parent-teacher associations throughout the country and doing much to make them more effective.

2. It is assisting mothers of young children and prospective mothers by personal correspondence, multigraphed letters and bulletins on the care of babies. Between fifty and sixty thousand mothers have beeen reached in this way.

3. Through its reading courses, several of which have been issued and three others are now in preparation, it has promoted good reading among boys and girls and men and women throughout the country. About 120,000 copies of the several courses already prepared have been distributed. More than 4,000 readers are registered. These readers are found in every State in the Union, in Hawaii, Porto Rico, Canada and China. The readers in foreign countries are of course Americans who live there. State library commissions are giving support in all of the states in which there are such commissions. City libraries are buying the books of previous reading courses in larger numbers so as to be able to supply the demand for them. Circulating libraries in some states are doing the same. The libraries also advertise the courses. Many of them post the courses where they can be seen by their readers. This is also done in many high school libraries. It has had a good effect on the supplementary reading of high school boys and girls.

Up to 1917 three international conferences on the welfare of the child had been held in Washington, D. C., the invitations having been sent to all nations by the Department of State. National child welfare conferences have been held annually, and annual state child welfare conferences have awakened every part of the country to the many needs of the children which must be met by home, church, school and state. See PARENT-TEACHER ASSOCIATIONS. H.K.S.

NATIONAL DEBT, the total of the money owed by a nation to individuals, corporations or to other governments, contracted as a result of wars, for territorial expansion, or to meet deficits when receipts from all usual sources do not equal expenditures.

Nations began over two hundred years ago to contract public debts, and in this Great Britain led. Previous to 1688, when the government of that country needed money, the king gave his personal pledge, secured by his jewels, for its repayment; but the revolution of that year made necessary other devices, and the credit of the whole nation was substituted, based upon acts of Parliament. Other nations soon began to employ like means to get money to meet emergencies, and to-day practically every civilized country has a standing indebtedness, not excepting even careful, frugal Switzerland.

Political economists have uttered warnings because of the continual increase in public debts;

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Adam Smith prophesied before the year 1790 that the enormous obligations they assumed would eventually ruin European countries; today the nations owe ten times as much as in his day, and there is no indication that his warning had a logical basis.

United States Debt. After the Revolution the young nation was in debt for expenses incurred by Congress to carry on the war, and it also assumed the war debts of the thirteen States. Thus, in 1791, the national debt was $75,463,746.52. It increased to nearly $87,000,000 in 1804, then decreased gradually until the second war for independence. That conflict left a debt of $127,334,933.74 in 1816, but by 1835 the country was so nearly free from indebtedness that it owed only $33,733.05. Not since then has it been so low; the Mexican War increased it, and the War of Secession raised it to the tremendous total of $2,773,236,173.69 in 1866. By 1893 this was reduced nearly one-half, which means that the reduction during this time averaged $5,185 for every hour of the intervening twenty-seven years. After 1893 the debt began to increase, and in 1912 again passed beyond its highest war total, with a new record of over $2,868,000,000, due to large expenditures for the Spanish-American War, to resulting increase in the pension roll, to lavish expenditures for public buildings and for river and harbor improvement, and for the construction of the Panama Canal. The public debt of the United States each year since 1860 is given in the following table:

YEAR	AMOUNT	YEAR	AMOUNT
1860..	$ 64,842,287.88	1886..	1,775,063,013.78
1861..	90,580,873.72	1887..	1,657,602,592.63
1862..	524,176,412.13	1888..	1,692,858,984.58
1863..	1,119,772,138.63	1889..	1,619,052,922.23
1864..	1;815,784,370.57	1890..	1,552,140,204.73
1865..	2,680,647,869.74	1891..	1,545,996,591.61
1866..	2,773,236,173.69	1892..	1,588,464,144.63
1867..	2,678,126,103.87	1893..	1,545,985,686.13
1868..	2,611,687,851.19	1894..	1,632,253,636.68
1869..	2,588,452,213.94	1895..	1,676,120,983.25
1870..	2,480,672,427.81	1896..	1,769,840,323.40
1871..	2,353,211,332.32	1897..	1,817,672,665.90
1872..	2,253,251,328.78	1898..	1,796,531,995.90
1873..	2,234,482,993.20	1899..	1,991,927,306.92
1874..	2,251,690,468.43	1900..	2,136,961,091.67
1875..	2,232,284,531.95	1901..	2,143,326,933.89
1876..	2,180,395,067.15	1902..	2,158,610,445.89
1877..	2,205,301,392.10	1903..	2,202,464,781.89
1878..	2,256,205,892.53	1904..	2,264,003,585.14
1879..	2,340,567,232.04	1905..	2,274,615,063.84
1880..	2,120,415,370.63	1906..	2,337,161,839.04
1881..	2,069,013,569.58	1907..	2,457,188,061.54
1882..	1,918,312,994.03	1908..	2,626,806,271.54
1883..	1,884,171,728.07	1909..	2,639,546,241.04
1884..	1,830,528,923.57	1910..	2,652,665,838.04
1885..	1,863,964,873.14	1911..	2,765,600,606.69
1912..	2,868,373,874.16	1914..	2,809,262,118.66
1913..	2,926,434,346.66	1915..	3,225,734,627.16

Canada's Debt. The public debt of Canada was created in 1867 by the formation of the Dominion, which assumed the liabilities of the separate colonies to a total of $92,500,000. Unlike the United States and most other countries, Canada has had no great wars to burden the population with a large and sudden increase in the national debt. There has been, however, a steady growth, due chiefly to expenditures for internal improvements of all kinds, including the construction of public works, canals and railways, and to cash subsidies to railways. The participation of Canada in the War of the Nations added very largely to its debt. The following table shows the increase:

YEAR	DEBT	YEAR	DEBT
1867	$ 93,046,052	1911	$474,941,487
1870	115,993,707	1912	508,333,592
1880	199,125,323	1913	483,232,555
1890	286,112,295	1914	544,391,369
1900	346,206,980	1915	700,473,814
1910	470,663,046		

In Other Countries. France had the largest national debt of any country in the world when the War of the Nations began in 1914. To the credit of the nation it can be said that it was very largely owed to French citizens, who have always been notably thrifty and always able to respond to government calls for loans. The great war had embroiled fifteen nations by the end of its second year, and the debts of each increased at an appalling rate. A table showing their debts in 1914 would be worthless from present standpoints; to summarize their financial condition in 1917 would be impossible, for each day of the duration of the war added many millions to the debt of each, and in the areas of combat other millions were daily destroyed which must later be accounted for.

In 1914 Germany's debt was reported as $3,854,795,000; France owed $6,347,540,000; the United Kingdom, $5,673,374,000; Italy, $2,921,153,000; Russia, $4,536,939,000. E.D.F.

NATIONAL EDUCATION ASSOCIATION. see subtitle, in article EDUCATION, page 1952.

NATIONAL GUARD, volunteer defense forces of the several states of the American Union. See MILITIA.

NATIONAL HYMNS. See HYMNS, NATIONAL.

NATIONAL MUSEUM OF THE UNITED STATES, a government collection of antiquities, scientific specimens, etc., at Washington, D. C., under the control of the Smithsonian Institution. In 1876 the Smithsonian authori-

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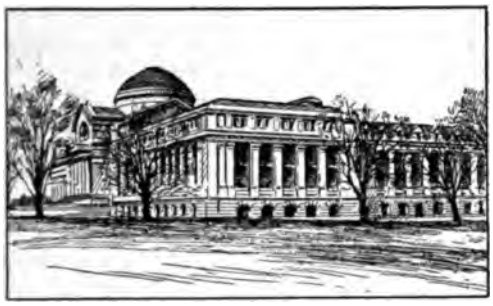
ties chose from their very large supply a large number of relics and specimens to be exhibited at the Centennial Exposition in Philadelphia. This collection was arranged chonologically to show the history and development of the United States and was one of the most interesting departments of the Exposition. In 1877, when the exhibit was returned to Washington, the Smithsonian Institution was so crowded that no room could be found for the collection, and it



BUILDING OF THE NATIONAL MUSEUM

was therefore stored until Congress could take action. That body authorized the erection of a building for the exhibit in 1879, but in 1881, when the edifice was completed, it was found to be too small. In 1903 Congress ordered the construction of another large building, costing $3,500,000.

From the standpoint of history and patriotism the National Museum is of great value, for within its walls are stored innumerable mementos of American presidents, statesmen, soldiers and literary men, while the natural history specimens and the articles arranged to show the customs and manners of all races are probably not equaled in interest by any other existing exhibit. The secretary of the Smithsonian Institution is keeper of the Museum; he is aided in this work by an assistant secretary and over twenty chiefs of departments. The Museum has issued numerous valuable bulletins in zoölogy, botany and geology, which are distributed through the Superintendent of Documents of the Government Printing Office.

NATIONAL ROAD. See CUMBERLAND ROAD.

NAT TURNER INSURRECTION, *in sur ek' shun.* Nat Turner was an American negro slave, born in Southampton County, Va., in 1800. While but a child he fancied himself to be God's agent for some great work and watched for some sign which would indicate what the deed should be and when it should be performed. In 1828 he declared that a voice had told him to rise against the enemies of the negro race and slaughter them without mercy. Turner thought the eclipse of the sun in February, 1831, furnished him the sign for which he had so long waited, but he did not begin his "mission" until August 13.

On that date he assembled five other negroes, explained his plans, and on the night of August 21 killed five members of his master's family at Cross Keys, Va., and the next morning put to death all the pupils in a neighboring school. He compelled other slaves to join him, and by noon of August 22 was leader of a wild group numbering fifty-three. They went from house to house killing every white person they found, until their victims numbered fifty-seven. Before evening of that same day a great mob of white men were hunting the murderers, and were soon joined by United States troops and militia. The negroes were captured in October, were tried at Jerusalem, Va., and seventeen, including Turner, were hanged there on November 11. The massacre resulted in the immediate passing of more stringent slave laws in nearly every Southern state, free negroes were driven from many sections, and practically all State and Church efforts toward educating the colored race were temporarily halted in the South.

NATURAL BRIDGE, a structure created by the hand of Nature, which takes the form of a mass of earth or rock spanning a stream, gorge or other depression. In many instances a natural bridge is the result of the action of water which works its way slowly through loose soil or soft rock beneath a harder layer, gradually washing out the softer material. The solid upper layer is thus left a natural bridge. There are more than fifty of such interesting formations in the United States. Of these the best known is in Rockbridge County, Va., sixteen miles from Lexington, Ky. It is from fifty to one hundred feet wide, affording a comfortable passageway for traffic, is 215 feet above the stream below, and has a span of ninety feet. The thickness of the bridge is about forty feet. Originally the structure was a natural tunnel, but as water continued to percolate through the rocks the softer portions were loosened and all of the roof except this bridge portion collapsed.

In Utah there are three remarkable natural In Utah there are three remarkable natural bridges, all of which are pictured in these volumes in connection with the article UTAH. They are the Nonnezoshi, 308 feet high; the Edwin, 111 feet in height, and the Augusta Sandstone, 265 feet high. Other notable struc-

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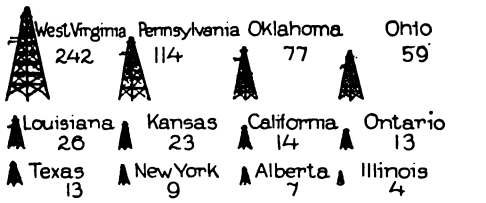
tures of this nature are found in Powell County, Ky.; Winston County, Ala.; Santa Cruz County, Cal., and elsewhere.

NATURAL BRIDGE, VIRGINIA

NATURAL EDUCATION. See subtitle, in article EDUCATION, page 1929.

NATURAL GAS. The first white men who crossed the Alleghany Mountains were taken by the Indians to places where gas was issuing from crevices in the rock. The Indians set the gas afire and then worshiped before the flames.



ANNUAL PRODUCTION

The average yearly yield for five years, ending in 1916, is given.

Some of the first oil wells sunk in Pennsylvania were forced through rock containing this gas. It was under high pressure and it sometimes flowed with such force as to throw the drill from the well. If it were accidentally ignited the flame extended high into the air. The gas known to the Indians, and later discovered in large quantities by those sinking wells for petroleum (which see), is now known as *natural gas*. It has about the same composition as illuminating gas and produces about the same amount of heat per 1,000 feet, but it does not give as good light. When first discovered, natural gas was considered an annoyance, but men soon learned that it was a valuable fuel, and its extraction from the earth is now an important industry. Natural gas occurs in regions where petroleum is found, and it is procured by sinking wells (see WELL BORING). The wells vary from a few hundred to three thousand or more feet in depth. The pressure in a new well may be as high as 1,000 pounds to the square inch, but usually it is less—500, 400 and 250 pounds and under being common. As the gas continues to flow the pressure decreases, and the flow from some of the oldest wells has ceased, showing that the gas is a product of some past geological age, and is not now being produced.

Production and Uses. The extraction of natural gas constitutes to-day an important industry in the United States. The chief producing states, in the order of their importance, are West Virginia, Pennsylvania, Oklahoma, Ohio, Louisiana, Kansas, California, Texas and New York. The annual production of natural gas for several years prior to 1917 has amounted to about 592,000,000 thousands cubic feet, valued at $94,000,000. One-third of the production is used for lighting and heating purposes in the homes of the people, for there are in the United States nearly 2,100,000 domestic consumers of natural gas. The remainder is supplied to industrial establishments, including iron mills, steel works, lead and zinc smelters, glass factories and brick factories, where it is used in place of coal. Natural gas is now carried by pipe lines from the source of extraction to many distant places. By a recently discovered method gasoline is manufactured from natural gas, which is becoming a most important source for supplying this very necessary commodity of modern life.

Production in Canada. Over 21,500,000 thousands cubic feet of natural gas, valued at $3,650,000, were extracted in Canada in 1914. Two-thirds of the amount is produced in Ontario and one-third in Alberta. There are three principal producing fields in Ontario, known as the Welland County, the Heldimand-Norfolk and the Essex-Kent fields. A large, deep reservoir

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of natural gas was found in 1913 in the Petrolia oil field. In Alberta natural gas has been obtained from the two fields, known as Medicine Hat field, which has been producing since 1891, and the Row Island field, which has been producing on a large scale since 1912. Natural gas from this field is supplied to Lethbridge, Calgary and other towns of the district. W.F.R.

NATURALIZATION, *nat u ral i za' shun,* the legal process by which a person becomes a citizen of a country other than that of his birth. Though the details of form vary in all countries, a man who becomes naturalized always renounces allegiance to his native land and takes an oath of allegiance to his adopted country. In all countries a married woman and minor children are regarded as citizens of the state to which the husband and father owes allegiance. Thus naturalization of a man changes the citizenship of his wife and minor children. Unmarried men and women, however, of legal age, become naturalized in the usual way. In countries where military service is compulsory, men are not allowed to emigrate and renounce their allegiance unless they have served their time bearing arms, or have secured special permission from the government. Occasionally a man escapes without performing his service, but if he ever returns he is still liable to service, and in some instances is subject to imprisonment or heavy fine.

The whole theory of naturalization is, indeed, a modern development. Until the nineteenth century a man was a citizen of his native land regardless of where he lived, and the old maxim of the common law, "Once an Englishman, always an Englishman," had its counterpart in the law of practically every civilized nation. One of the causes of the War of 1812 was the British impressment of seamen who were of British birth but of American citizenship. It was not until 1870 that Great Britain formally renounced the old principle and recognized the right of individuals to transfer their allegiance. All the principal nations of the world, except Turkey, have enacted laws which provide for the naturalization of foreign-born persons.

In the United States. The naturalization of Chinese is prohibited by a law of Congress, and the courts also refuse naturalization to Japanese, Hawaiians and natives of India. Any alien (which see) who is a white person, or of African birth or descent, if he desires to become naturalized, must file a declaration of his intention with the clerk of the United States District Court or any state or territorial court of record which has jurisdiction over the residence of the applicant. This declaration must state the name, age, residence, occupation, time and place of arrival in the United States, and it must state the applicant's intention to renounce allegiance to every foreign potentate or state, and particularly to the one of which he may be a subject or a citizen. The filing of this declaration is called "taking out first papers." Children born abroad of United States citizens are themselves citizens and need not be naturalized.

Final Papers. Not less than two years after the filing of this declaration, and after not less than five years of continuous residence in the United States and one year in a state, the applicant may petition for his "final papers," a certificate of naturalization. The petition must be written in English by the applicant, and must state his name, age, birthplace, name of his wife (if he is married) and a number of other facts. The petitioner must declare himself not opposed to organized government; he must not be a polygamist or a believer in polygamy. The facts of his residence for five years and his general character must be verified by the testimony of two citizen witnesses. These petitions are heard by the court in open session not less than ninety days after the petition has been filed, and not less than thirty days before a general election. Aliens who have been honorably discharged from the army, or have served four years in the navy, may become naturalized without filing the first declaration of intention. An alien who becomes naturalized must speak English (if physically able) and must renounce any title of nobility or membership in any foreign orders. A fee of one dollar is required when the declaration of intention is filed and another fee of four dollars when the petition for final papers is heard by the court.

Rights of Naturalized Citizens. After naturalization a foreign-born citizen has all the rights and privileges of a native-born citizen, except that he can never become President of the United States. If he travels abroad he is entitled to the same protection given to native-born Americans. The right to vote is not, however, derived from the Federal government. This is a right granted by the state, and nearly half the states allow a foreigner to vote after he has officially declared his intention of becoming a citizen.

In Canada and Other British Dominions. Naturalization as a Canadian citizen involves naturalization as a British subject. Since Janu-

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ary 1, 1915, every person to whom a certificate of naturalization is granted is a British subject, not only in Canada, but also in the United Kingdom and in any other British territory. Persons naturalized before 1915 can apply for new certificates valid in any part of the British Empire. Before he is eligible for naturalization in the British Empire, an alien must be in residence for five years; if he wishes naturalization in Canada or Australia he must be a resident of the Dominion or the Commonwealth for a year preceding his application.

Section 24 of the act respecting naturalization of aliens makes the following limitation:

> An alien to whom a certificate of naturalization is granted shall, *within Canada,* be entitled to all political and other rights, powers and privileges, and be subject to all obligations, to which a natural-born British subject is entitled or subject within Canada, with this qualification that he shall not, when within the limits of the foreign state of which he was a subject previously to obtaining his certificate of naturalization, be deemed to be a British subject, unless he has ceased to be a subject of that state in pursuance of the laws thereof, or in pursuance of a treaty or convention to that effect.

Aliens may also become British citizens by special act of Parliament. Prince Albert was thus naturalized when he married Queen Victoria. An alien woman who marries a British citizen thereby acquires British nationality and requires no formal naturalization; in this manner many American women have become British subjects.

In Other Countries. In Belgium and Russia a residence of five years is required preceding naturalization; in France, Sweden and Greece, three years; in Argentina two years, and in Portugal one year. In Austria a residence of ten years in itself entitles an alien to all the rights of citizenship, but in Germany there is no fixed period of time. Naturalization in Germany is under the control of the central administrative authorities, dominated by the military power of the empire. An applicant must show that he is legally free to change his nationality, or if he is a minor, that he has permission from his father or guardian. He must, moreover, possess an income sufficient to support him or be engaged in a legitimate business or profession. A Turk who wishes to become naturalized elsewhere must not only secure permission from the sultan's government but must agree never to return to Turkey. W.F.Z.

NATURAL SELECTION, the theory, first advanced by Darwin, that "New species may result from the selective action of external conditions upon the variations from their specific type which individuals present." When Darwin's book, *The Origin of Species by Means of Natural Selection, or The Preservation of Favoured Races in the Struggle for Life,* came out in 1858, it gave the word *evolution* a new meaning; it advanced a theory as to how all living things came to have their present form, for the theory applies to the highest as well as to the lowest, to men and to all forms of animal and vegetable life.

Selection by Life and Death. All living creatures are prolific—that is, they tend to produce a great many young of their own kind. If all the young of the various species were to live and produce still more young, the world would speedily become overcrowded. There are so many more individuals born than can possibly survive, because of limitations of space and food, materials for shelter, and so forth, that the very slightest advantage of one over the other may keep the one alive and kill the other. Thus Nature, working as a ruthless force to keep the world habitable, accomplishes the purpose by killing off the weak, or those forms which are not adapted to the conditions under which they must live if they survive, and by favoring the others.

Young of the same parents, in all forms of life, differ more or less widely. These variations, slight as they are, tend to be inherited; if the variation is such that it hinders or incapacitates, the species becomes extinct; if it is in the direction of increased fitness, it becomes a characteristic of a surviving species. So it seems that all forms of life are fighting, usually without realizing it, for a chance to live. This fight has given rise to two phrases, "the survival of the fittest" and "the struggle for existence," by which Darwin meant not only that the individual must be successful in maintaining life under his conditions, but that he must leave young; otherwise, his species, composed of individuals with the variations and characteristics which have made him a survivor, will die out.

Arguments for Natural Selection. The above, of course, is only a theory. Many scientists differ from Darwin, and hold that though he has accounted for *preservation* he has not proved *origination* through his theory of natural selection. The majority of thinkers, however, are inclined to accept the Darwinian view, and since his time every effort has been made to get definite evidence in proof of his hypothesis. Darwin himself admitted that it is hard to

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prove, and that it is only by observation of present forms and their fitness for their environment that we are able to believe in selection.

One of the most satisfactory proofs of the theory is the way that man is able, by breeding domestic animals, to produce characteristics which will make his animals more useful to him. All the domestic animals have wild ancestors: the wild boar has been domesticated into the pig; wolves, foxes and hyenas into dogs; horses, sheep and cattle were once wild creatures, and all fowls have been domesticated; once tamed, man's animals have been bred to produce specific traits for his convenience and use.

Another argument in favor of Darwin's theory is the importance of protective coloring in determining survivals. If green and brown moths of the same genus are exposed on brown grass, after a short time the green ones will have disappeared, eaten by birds, while the brown moths, rendered invisible by the similarity of their coloring to that of the grass, will survive.

Luther Burbank, whose production of new fruit and flower forms has seemed like magic, is a disciple of Darwin, and he puts his principles into operation. Eugenics, "the newest of the evolutionary sciences," is man's attempt to do for his own race what he has so long been doing for his plants and animals. See EUGENICS; EVOLUTION; BURBANK, LUTHER. A.C.

Consult Thomson's *Darwinism and Human Life;* Lloyd's *The Growth of Groups in the Animal Kingdom.*

NATURAL THEOLOGY, the system of theology which holds that God may be known through His works. In the eighteenth and nineteenth centuries it was considered to be directly opposed to the theology of revelation and to deny all that is miraculous and supernatural in religion. However, in the thought of to-day, in which both natural and supernatural are regarded as being subject to similar laws, Nature and the Bible are generally viewed as harmonious sources of knowledge, and the old contention has died out.

NATURE STUDY is a means of awakening in boys and girls an intelligent interest in the wonders and beauties of the world about them. The great naturalist Huxley once said that a person who knows little or nothing of natural history is to be compared to one who passes through an art gallery which has its pictures turned toward the wall. Such, indeed, is the lot of boys and girls who are permitted to go through school life with "eyes that see not" and "ears that hear not," in so far as the world of nature is concerned. Happily, modern educators have come to see that the systematic study of objects in nature should have a place in every school curriculum.

How the Idea Developed. So general is the conviction now that a part of every school day should be spent in studying the outdoor world by observation that it is hard to realize how much resistance this idea met with when it was first introduced, about the year 1885. Nature study was unknown before that time, although textbooks in natural history were not unfamiliar to the school children of that day. Once the idea was introduced, people for the most part held that it would be a mere waste of time to put this study into the school curriculum; that the school day was already all too short and that to introduce a new study was to take time which was needed for those *necessary* ones already established.

However, the best educators, who were fathering a larger educational movement away from "culture studies," so called, of which this was only one aspect, insisted on the importance of the new study. They contended that the end of education was not merely the acquiring of a certain amount of learning. They held that education had no right to the name unless it had for its purpose as well the preparing of men and women to live better. Children needed to be equipped for active, productive, joyous living as well as to be grounded in the elementary studies—reading, writing, arithmetic, etc. The

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magazines for many years published articles and discussions of the new study. Gradually, because it was championed so stanchly by prominent educators, it began to gain ground. To-day it is an accepted part of regular work in most public schools.

The Value of Nature Study. Above everything else, nature study should give a child a sense of companionship with all out-of-doors, and with all living things. From these he will learn to appreciate color and form and sound. The thundercloud piled in the western sky, the flash of the robin's red breast, the down on the wing of a moth, the bird songs, the sound of rain on the roof and of the wind in the tree tops, the murmur of the brook—all these will be a real part of his world, for him to inquire into. For a child who acquires this sensitiveness to beauty, such stanzas as those from Jean Ingelow, printed on page 3319, will take on new meaning.

This sense of kinship with all living things should inevitably follow the study of nature. If it does not, then the study might better be abandoned. However, if there is in the teacher's heart a real love of nature, such results are not likely to occur.

The outdoor expeditions which form so important a part of nature study not only keep the child in the open air but also teach him how to occupy his time when he is in the open. Children who form a genuine interest in the subject are not likely to get into mischief. All children have a little of the vandal in them. A love for and interest in growing and living things will check this impulse to mutilate or to destroy.

Dr. Hall of Clark University once said: "Nature in its broad conception includes the fundamental subject matter of all education." Francis Parker expressed the same idea in other words. Both these highly-educated and intelligent men had a broad and noble conception of the value and purpose of education. They realized that in the immediate world about the child were all the materials for accomplishing this purpose. And it is true that nature study can be correlated with every other study the child takes up—with language and reading, with arithmetic, geography and history.

For instance, consider language work. Boys and girls dislike language exercises, as a rule, simply because they are not interested in the subject matter about which they write. If they are interested and can feel at the same time that anything they may have to say will be of interest to some one else, the language lesson will be robbed of its tedium. In their nature lessons they will have an unlimited source of interesting subject matter. A field notebook will furnish numberless language exercises without the pupil's being conscious of it. This notebook should be the pupil's exclusive possession and need not be shown to the teacher unless the child so desires. The observations put down in this notebook should not be corrected. Pointing out errors of grammar, punctuation and spelling would tend to check the pupil's freedom of expression.

If excursions are frequent (and they should be), it is probable that all the boys and girls will have a vivid interest in putting down an account of what they see and hear, but this account will lose most of its charm if the child becomes self-conscious. However, since pupils learn to write by actually writing, the exercise will be of sufficient value, even though mistakes are frequent—and they are bound to become less and less frequent as time goes on. Older pupils will get helpful suggestions from such writers as Ernest Thompson Seton, Thoreau and John Burroughs. Thompson Seton's books are embellished with marginal notes and illustrations which are particularly interesting and helpful.

The correlation of nature study and drawing is also inevitable. All boys and girls love to draw. For the very young pupil, drawing is a natural, though very crude, means of expression. As soon as this drawing is done under direction it loses a part of its value. The formal study of drawing must, of course, be done under direction, but it is not unlikely that the drawing done in notebooks or in nature study classes is of even greater value. Each pupil should be permitted to choose his medium for the work—pencil or pen and ink or water colors or colored crayons—and be allowed to draw anything that appeals to him as the subject for a picture. Most of the pictures produced will be poor, of course, but on the other hand, because the pupil is intensely interested, some will be surprisingly good. It is probable that with some pupils this spontaneous drawing will compare very favorably with that done in the formal drawing class.

In beginning work, geography and nature study are very closely interrelated. All geography study should begin with the home environment of the pupil, the outdoor world which he knows. Francis Parker in his book called *Talks on Teaching* explains fully his con-

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cept of how the elementary studies which the pupil takes up can be correlated. He includes in this interrelation not only all of the natural sciences but the exact sciences as well—even arithmetic. Taught as a science of quantity, arithmetic can be developed as a corollary of almost any other subject. In the measuring of distance, computing areas, forming conceptions of numbers and quantities, arithmetic is constantly being used both in geography and in nature study. For instance, in a fly-breeding experiment, the boys and girls may work out, mathematically, the increase in the number of flies that result with each generation. In laying out gardens, measuring trees — their height, breadth and thickness—in counting seeds and in numberless other ways exercises are furnished which are all the more valuable because they are not labeled as arithmetic.

A garden, as such, is not necessarily a lesson in nature study, but it may be made one, if the boys and girls are taught what to plant and at what season, why seeds are planted in some cases and in other cases seedlings; or if they study the weeds which they uproot, and observe the harmful and the helpful insects and grubs. An interest in gardening may in some cases lead to a genuine interest in agriculture.

The Teacher. There is perhaps no study in the entire school course which requires greater ability on the part of the teacher. A leading authority on methods of teaching this fascinating subject demands no less of the teacher than this:

"At least he must have the nature sympathy that every human soul needs to keep him near to his highest self: response to the sun and the wind and the rain; to starry night and moonlit wood; to brook and lake and ocean; to wayside flowers; to moss and fern; to the smell of plowed fields; to the mystery of a seed; to the glory of orchard in bloom or in harvest; to level sunlit cornlands; to far-reaching timothy fields; to the song of early birds; to the dawn of a new day."

In brief, the teacher must have, above all, a genuine love of nature. But she needs, of course, more than this; she must have accurate knowledge. This need not be obtained through formal study. Many a teacher with the habit of accurate observation and equipped with a few good books has adequately prepared herself for such teaching. If she is a real nature lover, with a genuine interest in her subject, with eyes to see and with ears to hear, she cannot go far astray or fail to take her pupils with her.

The Teacher's Equipment. The equipment for teaching nature study is not costly. Books are of first importance. There should be in the teacher's library at least a good textbook on botany, zoölogy, physiology, physical geography and mineralogy, and several good general books on the whole subject. Educational journals will be found to contain much valuable material, and the general magazines frequently contain valuable information. A general reference work, comprehensive but written in clear, simple language, should be in every school library. Books of poetry should not be overlooked, for they will do much to give the child visions of beauty which he cannot express for himself. The teacher will probably need for himself such articles as a pair of field glasses, a jacknife, a pair of shears and a botany can; stout clothing that will stand all kinds of outdoor weather might very well be included in such equipment. Perhaps the most important item of all is the notebook, in which all of the outdoor observations should be recorded so they may be verified or accounted for later by means of reference books.

Equipment for Nature Study

One corner of the schoolroom should be furnished with a table where the objects and specimens which the pupils are constantly bringing in may be placed and cared for. Such a table could be put up by a carpenter or made by some of the older boys of the school. If the school board does not provide one, the materials could profitably be donated. In one country school the older boys brought lumber and built such a table, as well as a set of bookshelves, a shelf for the dictionary and a number of other things. These boys had no manual training, but most country boys can use tools.

A Terrarium. There ought to be both an aquarium and a terrarium. The latter may be a new word to most boys and girls, so the teacher should explain its derivation. If a regular glassed-in terrarium cannot be obtained any bit of earth will do, though it is not so effective a laboratory if no animal life can be confined within it. The terrarium can be made into a miniature outdoor world. First the bottom of a box should be covered with stones, as many different kinds as the children can collect, and a layer of soil should be placed over most of the surface. This soil can be car-

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peted with moss, or it can be sown with grass seed. The children will be interested in bringing in as many different seedling trees as they can find, and these can be changed from time to time. Tiny plants which bear transplanting

A TERRARIUM

can also be set out, to create a realistic scenic effect. Animal inmates of the terrarium will be a never-ending source of delight. Toads, turtles and salamanders, caterpillars, butterflies, potato beetles and other insects are easily procured. If possible, add a shallow pan of water for a pond so that those inmates which need it can have water. The terrarium can be emptied, if it seems desirable, and a hen or a rabbit or a duck may become an inmate for a day or two.

AN ANIMAL CASE

The Aquarium. Like the terrarium, it may be as simple or as elaborate as one desires. (Illustrations appear under the title AQUARIUM.) Any glass container will do for an aquarium, for even a jelly glass is large enough to harbor a whole family of insects. A layer of sand should be placed in the bottom of the jar, perhaps an inch deep. In this sand may be sown such water plants as watercress, stoneworts or water starwort. A layer of stones will then need to be added to hold the plants in place. It must be remembered that plant life is essential to the success of an aquarium, as the plants supply both food and oxygen to the inmates. In filling the jar it will be necessary to tip it and pour the water in very gently so as not to disturb the plants. Water from a tap should never be used; it should always be water from a pond or stream. A dip net can be used to get living creatures for the aquarium. In a large aquarium several varieties of aquatic life can be confined at the same time, but in a small one the animals will survive longer if each is kept in a separate jar. Prepared fish food, a bit of meat, insects or worms can be dropped into the jars for the inmates to feed on, with a string attached so that they can be removed at the end of a day; otherwise the water will become foul.

Insect Cages. Cages for insects may be made by putting an ordinary glass lamp chimney on the top of a flowerpot, and covering the top with a piece of cheesecloth or mosquito netting fastened in place with a rubber band. The aquarium jars may be covered in the same way if water insects, such as water beetles or water boatmen, are to be kept from escaping. A number of these insect cages can be used with profit. Flies may be bred in one; in others, plant lice, ants, ladybird beetles, butterflies or moths may be confined and observed. It is particularly desirable that the children should have a chance to note the life cycles of various insects.

Flowerpots should be furnished in abundance, as well as baskets and boxes, which may be used for gardening in miniature or for carrying specimens. If live animals are to be brought in, such as a kitten, a rabbit, or a chicken, a covered basket with two handles will be needed. There should also be garden tools and plenty of cheesecloth. The latter may be used for a number of purposes, not the least of which should be dusting. The pupils will need to learn to keep their tables and other possessions free of dust.

A Lens. If a lens can be procured it will prove a never-ending source of interest to the children. The best lens for young children is one they will not need to handle—one which is

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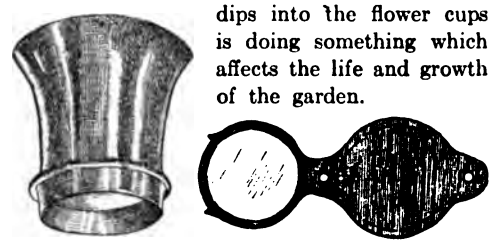
mounted on a tripod so that the object to be inspected may be placed underneath it. There is probably no one who does not take delight in seeing tiny things magnified so that every detail can be inspected in all its perfection. A potato beetle, a snowflake, a bit of moss or the heart of a flower is not only a thing of beauty, but also an intricate and fascinating marvel when seen through a lens.

TRIPOD LENS

The School Garden. Gardening, as such, is not nature study, but a garden can be made the basis for nature study. This is done by giving the children, for instance, the reason for everything they do in connection with the garden. When they are taught how to prepare the soil, teach them the reason for this from the standpoint of the plants' development. Lead them to observe that every plant is an individual, with peculiarities as marked as those of a human being. Teach them to note that each plant has its own form of flower, its own way of developing and planting its seeds. Make them see that every grub and earthworm, working beneath the soil, is doing something for good or ill, either helping the growth of the plants or hindering it. Every insect feeding on leaf or root, every bird that visits it, every bee that dips into the flower cups is doing something which affects the life and growth of the garden.



TWO FORMS OF MICROSCOPES

Aside from furnishing a laboratory for nature study, the school garden serves the purpose of giving the child some active work to do every day. Unfortunately, not all schools have gardens. Any country school and probably any village school could manage some sort of a garden, but unless ground is provided by the school board, it is almost an impossibility in towns, and the teacher and children will have to do the best they can with window boxes and flowerpots. If teacher and pupils work together to make the school garden productive; if the pupils learn from this piece of work how and what to plant, and a few fundamental facts about soils, they will be almost certain to want to have gardens at home. This is, perhaps, the happiest thing that can result.

Suggestions for the Study of Nature

In many kindergartens, particularly if the class is small, all nature study is taught out-of-doors. This is ideal, but unfortunately it cannot be achieved in most schools. But teacher and pupils should go on an outdoor expedition not less frequently than once a week. Froebel has something to say about this:

> At least once a week the teacher should take a walk with each class—not driving them out like a flock of sheep, nor leading them out like a company of soldiers, but going with them as a father with his sons or a brother with his brothers, and acquainting them more fully with whatever the season or nature offers them to see.
>
> Not only children, but indeed many adults, fare with nature and her character as ordinary men

A DAY WITH THE BIRDS

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fare with air. They live in it and yet scarcely know it as something distinct, and much less with reference to its essential properties concerning the preservation of life. * * * *

Therefore, these children who spend all their time in the fields and forests see and feel nothing of the beauties of nature and of their influence on the human heart. They are like the people who have grown up in a very beautiful country, and who have no idea of its beauty and its spirit. * * * *

It is important that boys and girls should go into the fields and forests with adults, *together striving* to receive into their hearts and minds the life and spirit of nature.

On the outdoor expeditions it is probably desirable that the teacher, as far as possible, should be an onlooker and let the children discover things for themselves. With very young children no detailed study is possible, but with older children interest may be keener if they go out with the idea of searching for some special insect or animal or plant or bird to study in detail. There is infinite variety in the things one finds to study. Seasonal changes, for instance, mean changes in the whole aspect of the world in which we live. These changes can be studied in all their aspects. The study of all the native wild birds and their habits, the study of wild flowers and weeds, of trees, of grubs and worms and insects, of a multitude of little animals, of the physical formation of the country round about—here is material for a lifetime of observation.

Life and Death. Perhaps no greater danger besets the pathway of the teacher than the question involved in her pupils' attitude towards life and death. It is inevitable that the pupil will acquire a sympathetic interest in the lives of the animals and plants studied, and this is quite likely to check the vandalism which most boys and girls have and which Froebel says originates in the pupil's desire "to obtain an insight into the inner life of the animal, to get at its spirit." He also adds that "failure to explain or to guide, as well as false interpretation or guidance, or the misunderstanding of this desire, may at a later period develop in boys hardened, intentional cruelty to animals." Nature study is the surest way to "explain and to guide" the pupil so that he will want to protect all living creatures—plants and animals alike.

One rule that will have to be made is that one must never kill wantonly or cruelly. Death in itself is not terrible. It is as natural and inevitable as life, and it need not be emphasized any more than the fact that creatures eat or fall asleep. When the pupil begins gardening he will learn that we have among plants both friends and foes, that weeds are foes and that many insects are foes. In studying the life cycle of a cabbage butterfly in one of the insect cages the pupil becomes interested in the living insect. He sees its development from yellow egg to the velvety green caterpillar, from the chrysalis to the white-winged butterfly, and to kill it would be unthinkable. But later, when the child is watering and cultivating his cabbage plants and the butterfly comes along as an enemy, it should seem quite normal to him to spray the cabbages so that the butterfly will die. But, to gain knowledge of the life story of insects or other creatures is nature study; to destroy them as pests is a part of agriculture or horticulture. The one may be of fundamental assistance to the other, but the two are quite separate and should never be confused.

Materials for Study. The whole outdoor world is the material for nature study. The subject matter might be classified in this way: *animal life,* under which will come the study of birds, fish, batrachians or amphibians, reptiles, mammals, and insects; *plant life,* under which will come the study of wild flowers, cultivated plants, flowerless plants, and trees; and another division might be called *earth and sky.* Doubtless this sounds rather formidable. Such a course it might well take a lifetime to cover; but it is really much less formidable than it sounds. The child cannot learn to know all the wild flowers, but he can learn most of those in his immediate neighborhood. Perhaps only a few will be studied in detail, but this study will enable him to observe other plants intelligently for himself, to take the concrete example as a basis of comparison with other examples. In studying birds, a minute study of one species will give him the key to all the other birds he sees.

And it must be borne constantly in mind that these subjects are not to be taught as a science, but merely as an interesting course of observations on living things. There was formerly a tendency to make nature study a study of dead things, but this has been changed. Not stuffed birds, but birds on the wing; not the dead moth impaled on a pin, but the moth hovering around a flame; not the mounted specimen butterfly, but the butterfly dipping into the flower cups; not pictured jungle animals, but animals with which the child is familiar—these should furnish the basis for nature study lessons.

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If one unalterable rule were to be made and followed in a nature study course it would be this: study live things. It may be difficult to achieve this at all times, but make it a rule. John Burroughs sounds another warning:

"I am not always in sympathy with nature study as it is taught in the schools. Such study is too cold, too mechanical, it is likely to rub the bloom off nature; it misses the accessories of the open air, it and its exhilaration, the sky, the clouds, the landscape, and the currents of life that pulse everywhere."

And Froebel says:

"In rendering the boy familiar with natural objects we are by no means concerned with the teaching of names or of preconceived views and opinions, but only with presenting the things themselves with their obvious attributes in such a way that the boy may view each object as the definite individual object reveals itself in its form, etc. Even the knowledge of a previously given name is unimportant; only the clear and distinct apprehension and the correct naming of the general and particular attributes are important."

Bird Study. Detailed suggestions for this branch of nature study may be found in the article BIRD, subtitle *Study of Birds,* page 733.

Fish Study. It will be comparatively easy to secure fish from ponds or lakes. Possibly one of the most easily-procured subjects is the goldfish. A detailed study of fish anatomy similar to that made with birds can be begun. The different parts of the fish can be named, perhaps by means of a diagram on the board. Its shape and size, its appearance from above may be noted; its fins, its tail, its scales, its gills, its eyes, etc., are all points of interest and significance. The bullhead, the common sucker, the shiner (minnow) and the sunfish may be taken for study after the subject of the goldfish has been exhausted.

Study of Frogs and Their Relatives (AMPHIBIANS or BATRACHIANS). This division of nature study may begin with the toad. A tadpole aquarium may be started, and the entire life cycle of the toad may be studied. This will intensely interest all children. The pupils will note the toad's protective coloring, which is so like the soil; its legs and feet, its behavior and its habits. If they are allowed to handle a pet toad, which might very well be a permanent inmate of the terrarium, they will learn, too, that the belief that a toad causes warts is only a superstition. Its usefulness in gardens should be emphasized. Next may come the tree frog, then the frog and the salamander.

Reptile Study. Thoreau says in his journal, "I have the same objection to killing a snake that I have to the killing of any other animal, yet the most humane man I know never omits to kill one." Perhaps reptile study, for lack of living specimens, can go no further than the garter snake, but if it teach only that this snake is a common and harmless little creature it will be of value. The study of the one snake will probably cure children of the unreasonable horror of snakes which most people have and which children acquire naturally. After studying the garter snake they might proceed to the study of a turtle. A small turtle may be placed in the aquarium; there should be a stone projecting out of the water for it to climb upon, or a pond might be made for it in the terrarium. The children should learn to know the most common species of turtles—the snapping turtle, the mud turtle, the pond turtle, the wood terrapin, the box turtle and the soft-shelled turtle. See TURTLE.

Mammal Study. This branch of study might begin in the winter with the rabbit, when the children will be able to find its tracks in the snow. Its coat, which changes in color to fit the season, its long ears, which give warning of approaching danger; its long legs, which enable it to run so swiftly, should all be dis-

FRIENDS IN SWAMPY PLACES

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cussed. Tame and wild rabbits may be compared. Perhaps there will be a chance to study a muskrat out-of-doors, and also mice and rats. The woodchuck will make an interesting series of lessons, and there is the squirrel, the chipmunk, and the little brown bat. Dogs and cats, goats and sheep, horses and cattle and pigs can be made the subject of endless lessons. In studying the domestic animals their economic value should be emphasized.

Insect Study. Insects are the most interesting, most numerous and the most available of all living creatures for nature study. The children will be fascinated by studying insect eggs under a microscope, for they are of widely differing forms and often of beautiful colors. From close observation of eggs they can follow the insect, just as they did the toad, throughout its life cycle. Caterpillars and moths and butterflies, the codling moth which works such havoc to fruit trees, and other parasites on trees furnish material for valuable study. And then there is the grasshopper, the katydid, the crickets, black and white, and the cockroach; there are dragon flies and ants and mosquitoes and house flies, potato beetles, ladybirds, fireflies and ants; wasps and hornets and bees, and spiders—materials for years of study and so fascinating that one hardly knows where to begin.

Plant Life. All pupils love flowers and enjoy bringing them to school. Flower study may be begun simply by teaching the children to know by name the flowers which they bring in; it will not be long before the names of all the common flowers, both wild and cultivated, will be familiar. Another thing which may be taught very easily is care of flowers. Children should learn that, once they have picked a flower, they must take care of it—never allowing it to wilt because they are too tired or too busy to put it in water. It is impossible to outline here all the infinite ways of teaching flower study, but it is probably the most familiar branch of nature study to the teacher. The list of wild flowers and cultivated and flowerless plants is so long that it cannot be given here. The list of trees is also too long to be given. Lists of flowers and trees for study are given under those headings in these volumes.

In stimulating and encouraging the interest in trees, "leaf prints" of all the trees in the region will be a great help. The materials needed will be a thick plate of glass, large enough to contain the largest leaf on its surface, a tube of printer's ink, two rubber rollers, the sort that photographers use in mounting prints, and paper. To make a print put a few drops of ink on the plate of glass, and spread it with the roller, ink the leaf by putting it on the inky surface of the glass and passing the roller over it. Put the leaf between two sheets of paper and roll once with the clean roller, pressing down on it as hard as possible. Two prints are made at each rolling.

Earth and Sky. For earth and sky study there is a great variety of subjects, from a brook to a snowflake. The soil of the earth and the different minerals—salt and quartz, feldspar, mica and granite—furnish numerous topics for study. The story of the magnet can be made into a series of lessons, as also may the study of the air. Rain and hail and snow, winds, stars and sun and moon—all these can be studied, for does not "earth and sky" include the whole universe? A.C.

Helpful Books. The list of books that will be found helpful in the study of this absorbing subject is a lengthy one. In fact, such books constitute a library in themselves. The following can be recommended to those who desire books of a general character: Lange's *Handbook of Nature Study;* Hodge's *Nature Study and Life;* Gosse's *Romance of Natural History;* Hall's *Open Book of Nature;* and Bigelow's *Spirit of Nature Study.*

To the teacher the following will make an especial appeal: Jackman's *Nature Study for the Grades;* Wilson's *Nature Study in the Elementary Schools;* Munson's *Education through Nature Study;* Comstock's *Handbook of Nature Study for Teachers and Parents;* and McGovern's *Nature Study and Related Literature* and *Type Lessons in Nature Study.*

Then there are numerous books of a special character, wherein are described particular forms of outdoor life. Among the many charming and interesting books of this type are Holland's *Butterfly Book;* Step's *Wayside and Woodland Blossoms and Insect Artisans and Their Work; Marvels of Insect Life,* edited by Step; Hardcastle's *Birds of the World for Young People;* Wright's *Citizen Bird;* and Keeler's *Our Garden Flowers, Our Northern Shrubs and Our Native Trees.* In this connection, too, should be mentioned *The Nature Library* (seventeen volumes), which presents the whole realm of nature in a very readable form.

Related Subjects. No attempt is made here to list all the topics in these volumes which might with profit be referred to in connection with nature study, but it is believed that the ones here given will prove specially helpful, as many of them have been prepared from the "nature study" point of view. Under a number of them indexes are included, and the range of reading indicated is thus a wide one:

Ant	Astronomy
Aquarium	Bee

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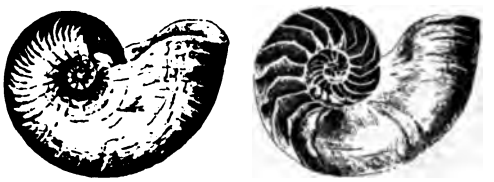
Beetle	Kindergarten
Bird (with list)	Language
Botany	Mosquito
Butterfly	Physical Geography
Cat	Plant (with list)
Dog	Rabbit
Fish (with list)	School Garden
Flowers (with list)	Seeds
Fly	Story-Telling
Frog	Toad
Gardening	Tree (with list)
Geography	Turtle
Geology	Weeds
Insect (with list)	Zoölogy

NATURE WORSHIP, the adoration of objects and forces in nature has been a part of the religion of many peoples. The mythology of the ancient Greeks and Romans, which was also their religion, has numberless stories in which objects in nature are seen as gods. The Greeks, for instance, said that the sun was a god who drove a chariot of gold across the sky. (For a full discussion of this see the article MYTHOLOGY.) The Persians worshiped fire, the Egyptians considered the serpent a good genius, and in Hindu temples to-day the sacred cobra has its devotees. The ancient Britons, Norsemen and Slavs held the oak tree sacred as the home of a god; our own Maypole dance is the reminder of the old ceremonies they used in their worship.

NAUGATUCK, *naw'ga tuk,* CONN., a town and borough in New Haven County, situated in the southwestern part of the state, five miles south of Waterbury and twenty-seven miles northeast of Bridgeport. It is on the Naugatuck River and is served by the New York, New Haven & Hartford Railroad and electric interurban lines. In 1910 the population was 12,722; in 1916 it was 14,093 (Federal estimate). The town was incorporated in 1893; it has a Federal building, constructed in 1916 and costing $53,000, the Whittemore Memorial Library, the Whittemore Memorial Bridge and a fine high school, also the gift of J. H. Whittemore. Here are important manufactures of rubber goods, woolen goods, underwear, malleable iron, cut glass, chemical acids, tools and shade rollers. The annual value of manufactured products exceeds $12,000,000.

NAUSEA, *naw'she a,* a disagreeable sensation that is best described by the familiar phrase, "sick at the stomach." The word is so strongly associated with *seasickness* that the latter is often used as a synonym for the former, and this seems not illogical when one considers the derivation of *nausea.* It comes from Greek and Latin roots which mean *pertaining to the sea,* and is closely related in origin to both *nautical* and *navigate.* The typical accompaniment of nausea is expulsion of the contents of the stomach (see VOMITING), and the sensation itself is always referred to the stomach, but the ailment is not necessarily due to stomach disorders. Revolting sights, disgusting odors, shock, sudden fright and painful, sudden blows are common exciting causes of nausea; the sensation is produced by the stimulation of certain nerves which have their centers in the medulla oblongata, and are connected with the stomach. Tendency to nausea varies widely for different persons. Some can endure without discomfort the tossing of a ship on the roughest sea, and others are nauseated merely by the gentle motion of a swing or hammock. As a tendency to nausea is sometimes a symptom of disease, anyone who suffers from chronic attacks should consult a physician.

NAUTILUS, *naw'til us,* a genus of deep-sea animals, consisting of four species, the best known of which is the *chambered,* or *pearly,* nautilus. These names refer to the many-chambered shell in which the nautilus dwells,



CHAMBERED NAUTILUS
In illustration at right a portion of the shell has been cut away, disclosing the chambers.

and to the inner lining of the shell, which is mother-of-pearl, or nacre. Millions of years ago, when the earth was in the early stages of geologic history, and the race of man had not yet appeared, the sea contained hundreds of species of nautilus, the fossils of which show marked resemblances to the existing species. The chambered nautilus lives upon the sea floor in the South Pacific and Indian oceans, notably in the vicinity of the Philippines and the island of New Guinea. The shell of the young animal looks like a small horn, but as the animal develops, its little home assumes the form of a spiral, and each stage of its growth is indicated by a chamber closed at the rear. That is, the nautilus moves forward as it grows, fashioning a partition behind it when it enters a new chamber; thus in the outermost compartment will be found the living animal. The closed chambers are supposed to be filled with a nitro-

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genous gas or air. The interesting process of building the shell is charmingly described by Holmes in his poem *The Chambered Nautilus:*

Year after year beheld the silent toil
That spread his lustrous coil;
Still, as the spiral grew,
He left the past year's dwelling for the new,
Stole with soft step its shining archway through,
Built up its idle door,
Stretched in his last-found home and knew the old no more.

Extending through the series of chambers, and connecting them with the body of the animal, is a coiled, fleshy tube, enclosed in a limy covering. This tube is called the *siphuncle.*

Though the nautilus is related to the octopus, it is not provided with the characteristic eight arms bearing suckers. Instead, there are about forty-five pairs of tentacles around its mouth, the pair on the inner side being joined to form a sort of hood that closes the opening into the shell when the animal draws back into the living chamber. These tentacles do not bear suckers, but their inner edges seem to possess the power of grasping objects by flattening against them. It is supposed that by them the nautilus obtains its food—small crabs and mollusks. The animal has a short, thick body, a large head, eyes and ears, four gills and a heart. On the underside of its body is a siphon, or funnel, its organ of locomotion. Through this tube it sends a jet of water with enough force to push it backward. According to some authorities, when it swims forward the tentacles branch out in all directions from the head. Some of the South Pacific islanders trap the nautilus and use it as food.

The nautilus belongs to the class cephalopoda, to which also belong the octopus and squid. In his famous poem Holmes confused the chambered nautilus and the argonaut, an entirely different cephalopod.

Related Subjects. The reader is referred to the following articles in these volumes:

Argonaut	Octopus
Cephalopoda	Squid
Mother-of-Pearl	

NAVAHO, or **NAVAJO,** *nahv'a ho,* a tribe of North American Indians, belonging to the Athapascan stock, who are known especially as the makers of the beautiful blankets that bear their name. Unlike the great body of Indians living in the United States and Canada, they are growing more numerous, their present number being estimated at 22,455. Less than half live within the boundaries of their great reservation of over 9,500,000 acres—a barren tract of rocks and sand in southwestern Utah, northeastern Arizona and northwestern New Mexico. The others roam the pasture lands outside or are at work in neighboring white settlements. The men and women are alike industrious and live in peace and contentment, doing a little farming, making pottery, baskets, silver ornaments and blankets, but supporting themselves chiefly by their herds of sheep, goats, cattle and horses. They are a wandering people, each family changing its place of abode as the pasturage and water supply give out. At the same time they build rather substantial homes at their regular halting places—round huts made of earth-covered logs, with a hole at the top for the smoke to come out. They care little for the refinements of civilization, and have never accepted Christianity, but hold to their old-time ceremonies and mythology. Like most of the other members of the widely-scattered Athapascan family they call themselves *Dîne,* meaning *people.*

DRESS OF THE NAVAHO

The Navahos were a source of trouble during the greater part of the period of Spanish occupation in what is now Southwestern United States, and for thirty years after the fall of Spanish power, between 1815 and 1845, they carried on the thriving business of stealing horses, cattle and sheep from the Mexicans. From the Pueblo Indians they learned the art of weaving, and from the Mexicans that of working in silver. Their first treaty with the American government was made in 1846, but there was more or less friction with them until 1868, and in 1863 it was necessary to send Kit Carson against them. In 1868 they settled down peaceably on the reservation allotted them, which was enlarged to its present dimensions in 1884.

Navaho Blankets are woven from the wool of the sheep herded by these Indians. The wool

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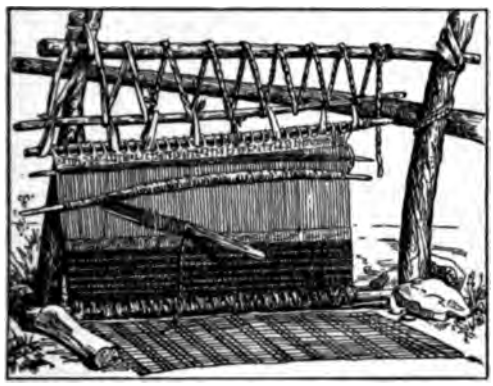
is washed, combed with coarse metal brushes, then worked into yarn on a spindle. The looms for weaving are similar to those used by other primitive peoples. Between two poles, set in the ground a short distance apart, are fastened



NAVAHO LOOM

Upon such crude devices the famous Navaho blankets are made.

two horizontal beams. Between these the warp is stretched. For a shuttle they use a blunt stick, and the weaving is begun at the bottom, the cloth being rolled on a long pole as the work progresses. Dark blue, yellow, red, black and white are the favorite colors, white and black wool being mixed to produce the much-used gray. The women become very skilful at weaving in certain designs. No two blankets are alike, for they do not work from any pattern or drawing, but plan as they weave. The Navahos are shrewd traders and do not exchange their blankets and silver ornaments for beads and tobacco. Their blankets bring good prices, the finest grade selling for $100 and more. The prices of the less expensive range as low as $10. C.H.H.

Consult Matthews' *Navaho Legends.*

NAVAL ACADEMY, United States, the most important naval school in America and one of the best equipped institutions of its kind in the world. It was authorized in 1845 by the United States government and established at Annapolis, Md., for the purpose of giving instruction to young men to fit them for positions as officers in the navy. The students of the Naval Academy are called midshipmen. Previous to 1902 they had been called naval cadets, but in that year the old term midshipman was revived.

Three nominations for midshipmen are allowed each Senator and Representative in Congress, two for the District of Columbia, fifteen each year for the United States at large, and twenty-five are admitted each year from the personnel of enlisted men in the navy. The nominations for the District of Columbia and the states at large are made by the President. New nominations are made only as vacancies occur by graduation, resignation or death; each vacancy is filled from the district to which the former midshipman was accredited, so membership in the school may be equitably distributed over the country. One nomination is allowed for Porto Rico, the nominee being a native and recommended by the governor of the island.

Entrance Requirements and Studies. The fact of nomination does not admit a young man to the academy; he must pass entrance examinations of high school grade and must be physically sound and of robust constitution. The course at the academy extends over a period of four years, when the graduates assume the work of ensign in the United States navy. The course of education and naval training is thorough, the discipline of the academy severe. Each midshipman receives from the government $600 per year during his course. Candidates for appointment must be between sixteen and twenty years of age. Candidates must be unmarried; if married during their course of study they are dismissed from the service.

The educational requirements for officers of the United States navy are so high that a candidate to be successful must have the groundwork of a broad education, for in four years

LOCATION OF THE NAVAL ACADEMY

of study he has to acquire knowledge sufficient to enable him to pass searching examinations before he can enter upon a naval career. A graduate of the Naval Academy must be a seaman, an engineer, a marine engineer, navigator,

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surveyor, and well acquainted with steam, electricity, and ordnance. He must also have a good knowledge of his own language and know some Spanish and French. The course is comprehensive and progressive. International law is an important branch of study; and when finally graduated an ensign from Annapolis is mentally and physically equipped to fill any position he is called upon to occupy.

From the first of June until the first of September the midshipmen are embarked on practice ships, a battleship temporarily detached from the fleet generally taking a certain number, while others go to a training ship.

The administration of the Naval Academy is vested in a superintendent, who is a naval officer of high rank, appointed by the President. As the equipment was found inadequate to meet requirements, an appropriation of $8,000,000 for improvements was sanctioned by Congress in 1905, as a result of which old buildings were remodeled and new ones erected.

Nearly every naval leader of the War of Secession was from his youth attached to a naval vessel and in that environment his education was secured; such men were David Farragut and the two Porters. The men in the navy who achieved fame in the Spanish-American War, however, were graduates of the Naval Academy, almost without exception. Among these were Admiral Dewey and Rear-Admiral Sampson, Schley and Evans. F.ST.A.

Consult Benjamin's *The United States Naval Academy.*

NAVAL MILITIA, *mi lish' a.* See NAVAL RESERVE.

NAVAL OBSERVATORY, a United States government institution which is a division under the bureau of equipment in the Navy Department. It is situated at Washington, D. C., and consists of not only an observatory with the usual telescope, but a large scientific library and numerous astronomical, meteorological and photographic instruments. It was established as a government institution in 1838 to observe the positions of the various planets and stars, for computing time on United States ships, to correct daily the local time, to test naval instruments for computing location at sea and to spread astronomical information among the American people.

Though it was not officially recognized until 1838, it really originated in a depot for charts established by a naval lieutenant in 1830. In 1833 another lieutenant built at his own expense an observatory to be connected with the chart depot, but in 1838 the Navy Department began to make annual contributions for the maintenance of such work. Four years later Congress authorized the erection of a special building at Washington for the observatory, and when this was finished the institution immediately began to take a leading position in the scientific world. In 1846 the *Astronomical Observations* was published, the first American book of this character.

In 1893 new buildings were erected at Georgetown, near Washington, and there some of the finest astronomical instruments in existence are to be found. One of these is the great telescope with a twenty-six inch lens, which at the time of its completion in 1874 was the largest in the world. With this instrument Professor Asaph Hall discovered the satellites of Mars in 1877, and with other instruments in the building important observations of Neptune and discoveries of various planetoids, meteors and distant stars have been made. Since 1912 the observers have been working in harmony with European observers in matters useful to all nations. The library of about 30,000 volumes is the most valuable collection of astronomical books in America.

NAVAL RESERVE, a reserve naval force that may be called into active service in time of war or during the existence of an emergency. Every country having a navy maintains a naval reserve formed of officers and seamen whose terms of enrolment in the navy have expired, or who have been honorably discharged.

The naval reserve of the United States was established by act of Congress in 1915. All citizens of the United States who have served in the navy for four years or more and have left the service under honorable conditions are eligible for enrolment. The term of enrolment is four years, and application must be made within eight years from final discharge. Those enroling within four months of discharge are placed in Class One, and all others in Class Two. Members of Class One are required to keep on hand such uniform as may be prescribed by the Secretary of the Navy, and all members of the naval reserve are provided with a badge to be worn when the uniform is not required.

Naval Militia. The naval militia constitutes a supplement to the naval reserve. It is organized and managed by the state governments, under the direction of the Department of the Navy. The term of enlistment is three years, and in 1917 the District of Columbia and

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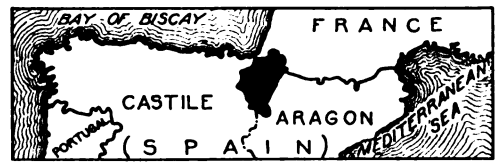
twenty-two states had naval militia corps. The members are not required to serve on ships, but opportunity for a certain amount of training on board ship is usually provided, each state maintaining a corps, usually being granted the use of one or more warships for this purpose. The Secretary of the Navy is also authorized to establish schools or camps of instruction for the naval militia, but during times of peace these camps cannot continue longer than six weeks in a year. In 1915 the naval militia included 600 officers and 7,700 men, and the law creating the naval reserve authorized the President in time of war to increase this number to 17,400. See MARINE CORPS.

NAVAL SCHOOLS OF INSTRUCTION are maintained by all the leading nations of the world for the purpose of special and technical training of officers and men for service in the navy. In the United States the Naval Academy (which see) at Annapolis, Md., is the leading institution of its kind and one of the best appointed in the world; in that school the post-graduate courses only are viewed as a naval school of instruction, the undergraduates being simply ranked as students not yet in the service. At the Naval War College at Newport, R. I., officers are instructed and plans for operations prepared. Goat Island, in the harbor of Newport, R. I., is the home of the Naval Torpedo School and there are other naval schools at Port Royal, S. C., Lake Bluff, Ill., and San Francisco, Cal. Camps or temporary schools of instruction may be established by the Secretary of the Navy at such points as he considers most convenient for instruction of the naval reserve.

The leading naval schools of Great Britain are at Dartmouth, occupying the old battleships *Britannia* and *Hindustan,* with large shore premises and the Royal Naval College at Greenwich, on the Thames. At Kiel, at the mouth of the Kaiser Wilhelm Canal (Kiel Canal), the German government maintains a finely-equipped training school. France has a similar institution at Brest. The object of these schools is the same in each country—to increase the efficiency of naval forces—but methods of instruction differ in many details.

There has within recent years been a strong and growing inclination on the part of Canada to build ships and organize places of instruction for Canadians wishing to serve in a "Canadian navy for Canada." The British Empire now provides naval protection for the Dominion.

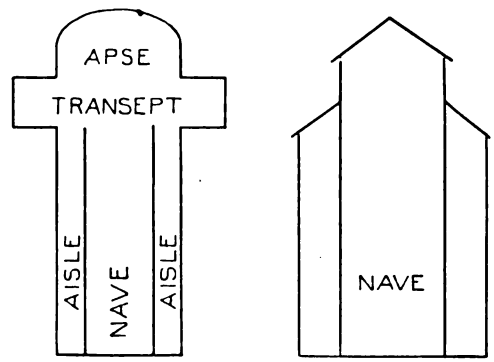
NAVARRE, *na vahr',* formerly an independent kingdom, which included a little of Southern France, but now a province of Spain, whose northern point touches the Pyrenees Mountains where they meet the Bay of Biscay. Its



LOCATION OF NAVARRE

area is about 4,055 square miles. The lower ground is extremely fertile and produces wheat in abundance. The fruit of Navarre is famous; from its apples cider is made, and its grapes are in great demand in Southern France to improve the flavor of French wines. Flax, oil and hemp are exported, and mulberry trees are extensively cultivated, principally for their leaves for feeding silkworms. The mountain slopes are covered with forests containing pine, beech, oak and chestnut. The streams abound with trout and other fish and large and small game is plentiful. Raising live stock forms an important industry, Navarre in this respect being the richest of all Spanish provinces. Navarre has been important in history.

NAVE. The floor plan of the earliest cathedrals was, in general, the shape of a Latin cross. The space corresponding to the arms of the cross, is called the *transept.* That part above the arms is known as the *apse* and con-



FLOOR PLAN OF A CATHEDRAL

tains the choir stalls and altar. The long main body of the building is called the *nave.* Usually on either side of the nave are *aisles,* separated from it by columns. The nave is the highest part of the building and is lighted by windows in the walls above the roof of the aisles. See CATHEDRAL.

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NAVIGATION, *nav i ga' shun,* the science of determining the position of a ship at sea, and so directing its course from place to place. Considering the many centuries man has ventured upon the sea, scientific navigation is relatively modern. Such early seafaring men as the Phoenicians, the Carthaginians and the Greeks felt their way from point to point along the coast and rarely ventured out of sight of land. The Vikings were hardly bolder, and the discoverers of Iceland were probably the crew of a ship blown out of its course in a squall. Towards the close of the Middle Ages, however, navigation made great strides. It was the feat of a brave navigator of the period—the discovery of America by Columbus—that chronologists adopted as the starting point for the modern era. With the discovery of an instrument for determining longitude, and later, with the invention of a device for taking the height of the sun and stars, greater accuracy in holding a course was made possible. Trigonometry and logarithms began to be used in calculations by the beginning of the seventeenth century.

The course of the ship is determined by the use of the compass (which see). The log, usually heaved once an hour, registers the rate of progress (see LOG). The position of the ship may be determined by noting the distance covered in a given direction. This method, however, is less satisfactory than that of taking frequent observations of the sun or the stars and determining the position by reference to data furnished by the *Nautical Almanac,* which gives the position of the chief heavenly bodies for fixed times at Greenwich. An accurate and detailed chart is, of course, indispensable. In addition to the compass and the log, the chief instruments required are the chronometer and the sextant. See OCEAN, subtitle *Ocean Routes.*

Freedom of Navigation. During the period of discovery, in the fifteenth and sixteenth centuries, it was not only the new lands that were claimed by the discoverers, but newly-found portions of the sea, as well. There was a "Spanish main," for instance, and Spain demanded the right to control navigation in that part of the ocean. During the nineteenth century, however, the principle became well established that the high seas could not be claimed by any one country, and that all nations had a right to unrestricted navigation of them. Only in the case of straits leading to inland seas or of narrow, shut-in arms of the ocean has there been much unfriendly controversy in recent years. See WAR OF THE NATIONS.

NAVIGATION ACTS, the name given to a number of laws passed by the Parliament of England in 1645 and in later years for the protection of British commerce. The first Navigation Act, passed in 1645, decreed that all importations from any country in the world should be shipped into England only in vessels built in England or in her colonies or in those manned by English masters and mariners. The second Navigation Act, passed in 1663, levied excessive taxes on goods brought into British colonies from all foreign countries. Later, duties were levied on goods shipped between colonies, if the same products could be obtained in England. In 1719 Parliament condemned all colonial manufactures as "tending to independence."

Before 1761 twenty-nine acts had been passed in restraint of colonial trade, including one law which prohibited molasses and sugar importation. America suffered little from these laws, owing to the custom of smuggling, which the colonists looked upon as a legitimate business. Several provisions of the acts were favorable to American industry, especially shipbuilding, and certain privileges were enjoyed by colonial manufacturers which were debarred to all others. However, the restriction and suppression of trade and manufacture was vigorously censured by the Americans, and was one of the principal causes of the Revolutionary War.

NAVIGATION LAWS, laws intended to regulate the shipping of any country. Early navigation laws were drawn expressly to deprive foreign ships of the right to engage in the carrying trade. The American colonies, for example, were restricted to English markets and were obliged to ship their goods in English vessels, except where they had their own vessels. Navigation laws, adopted by most of the maritime powers and retained until about the middle of the nineteenth century, forbade or restricted the registration of vessels foreign built or foreign owned; required the major part of the officers and crew to be of the country of registration, and otherwise hampered free shipping.

These hard conditions have been much modified of late. In America it came to be seen that rigid navigation laws, which prevented the registration of foreign-built ships, were arresting the growth of a merchant marine. The War of the Nations, which in 1914 swept so large a part of the foreign carriers from the sea, resulted in the passage of liberal laws with regard to the registration of foreign-built ships; however, few such vessels were added to American registry. See MERCHANT MARINE.

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NAVY, *na'vi.* In the days of Queen Elizabeth Sir Walter Raleigh said:

> Whosoever commands the sea commands the trade, and whosoever commands the trade of the world commands the riches of the world and, consequently, the world itself.

The importance of a navy to a nation having an extensive seacoast and the great advantage of being able to control navigation upon the high seas have been forcefully illustrated in the War of the Nations, and it is well at the outset to know of just what a navy consists. We usually think of it in terms of 30,000-ton battleships, but it includes far more. In the words of one of our best authorities, "The sea power of a nation may be said to include all its means for contesting the control of the sea. It includes the battle fleets and their auxiliaries, cruisers, destroyers, submarines, aircraft, also naval bases and stations, fortified and naturally protected harbors, coast defenses, the merchant marine (embracing armed and unarmed vessels engaged in commerce and passenger traffic)—in short everything the country possesses that may be useful, directly or indirectly, for naval warfare." We notice that this is a statement of what *sea power* includes, and so much of it as pertains to ships and their equipment and supplies and men to operate them constitutes in its broadest sense the navy of a nation. In its narrowest sense, the one in which the term is generally used, the navy includes the warships and their auxiliary ships, with the necessary personnel of officers and men.

What a Navy Does. In every war between nations having navies there are sea fights, but usually their number is small compared to the number of engagements between the armies. Nevertheless, the work of the navy may be far more influential in bringing a war to a close than all the engagements of the hostile armies together. Of course, when nations separated by the sea engage in war, the navy constitutes the first line of defense for each belligerent, and it becomes the first line of offense when an invasion is attempted.

The second duty of the navy in war is to blockade the ports of the enemy so as to prevent it from trading with other nations (see BLOCKADE). In the War of the Nations the navies of the allies practically gave them control of the Atlantic, and they were able to blockade the ports of the central (Germanic) powers to such an extent as to prevent these powers from securing much-needed supplies. In the War of Secession (which see) the blockade maintained by the Federal government was effective in bringing the conflict to a close because it prevented trade between the Confederate states and foreign nations. In time of war it is the duty of the navy to protect such means of communication as submarine cables, and wireless stations located on islands and along the coasts and under the jurisdiction of its own government. It is also its duty to destroy or damage these means of communication belonging to the enemy. Valuable service is therefore often performed by single ships or by small squadrons of three or four ships in patrolling the waters near these stations and near the landing places of submarine cables.

In times of peace continuous training is given the personnel to increase the efficiency of both officers and men. Old ships are repaired and usually a number of new ones are built each year. The equipment also is constantly being improved and new inventions are adopted whenever their addition will make the work of the navy more effective. Powers having colonial possessions make use of their navies for transporting officers and men in the colonial service, for protecting the colonies against aggressions of unfriendly powers and for quelling insurrections.

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The Modern Navy. The navies of the Great Powers are the result of centuries of study and experience. They contain the most perfect instruments of warfare and the most highly trained bodies of men of any organizations in the world. The greatest development has occurred since the War of Secession, and the first step in this development was the introduction of the ironclad warship, the first battle between vessels of this type being fought in Hampton Roads, Va., March 9, 1862 (see MONITOR AND MERRIMAC). After this battle all naval powers began to construct armored warships, and the progress since the adoption of this type of vessel has consisted chiefly in making larger and stronger ships and in perfecting the ordnance which constitutes their armament. This includes increasing the size of the guns and the perfecting of the machinery for operating them. The most powerful battleships of the dreadnaught type now carry 16-inch guns that will throw a shell weighing nearly a ton sixteen miles. The following comparison affords a good illustration of the progress in naval construction and equipment. One of the most noted naval battles in American history was the Battle of Lake Erie in the War of 1812, in which Commodore O. H. Perry destroyed the British fleet under Commodore Barclay. "The combined broadsides," says a naval authority, "of all Perry's fleet on Lake Erie scarcely weighed as much as a single shell from one of our big turret guns."

Battleship. For a full description of battleships the reader is referred to the article WARSHIP. This article deals with battleships only so far as is necessary to an understanding of the different classes of ships that constitute a modern navy. The big-gun ships upon which the navy chiefly relies in battle are of two classes—battleships of the first class or *dreadnaughts* and *dreadnaught battle cruisers* or *pre-dreadnaughts.* The pre-dreadnaughts differ from the dreadnaughts chiefly in their armament. Instead of carrying all big guns and torpedo defense guns, they carry some big guns and some smaller guns. Next to the pre-dreadnaughts come the *armored cruisers,* which are faster and carry less armor and smaller guns. The *light cruiser* is a fast ship; it is used for scouting purposes, and in war, for destroying commerce. Following the classes described come torpedo boats, destroyers, transports, colliers, hospital ships and supply ships, the ships of each class having their special work, and all classes being necessary to a completely developed navy.

Personnel. The strength of a navy is usually rated according to its number of ships of different classes and the number and size of its guns. But such estimates are often at fault, because they do not take into consideration "the man behind the gun." As we have already remarked, the men of the navy are the most highly trained body of men in their country's service, but the training in some navies is much better than that in others, and ships with an inferior armament often disable or destroy ships of a heavier armament, because the inferior guns are operated by better marksmen. A good illustration of this fact is seen in the destruction of the Spanish fleet off Santiago, Cuba, in the Spanish-American War. The marksmanship of the Spanish gunners was so poor that practically no damage was done to the American ships, while nearly every shot from the American ships was effective. The best of armaments in the hands of unskilled men is practically useless. For this reason each naval power tries to raise the men of its navy to the highest degree of efficiency. See NAVAL SCHOOLS OF INSTRUCTION, page 4093.

Navy of the United States

Early History. The navy of the United States came into existence in 1775, at the beginning of the Revolutionary War, and consisted of a few small vessels armed and manned by New England seamen. Its first service consisted in blockading the port of Boston and capturing a number of British ships. A naval commission was appointed by Congress the same year, and the government immediately began the construction of ships of war. At the close of the Revolution, the American navy consisted of sixty-four vessels carrying 1,242 guns, besides nearly 800 privateers. The ships built by the colonies were the equal of any warships of the time. After the Revolution the navy was allowed to decline, but interest in it was revived in 1794, and the construction of several men-of-war was ordered. Among these was the *Constitution* which became one of the most famous of American ships (see CONSTITUTION, THE).

In the commerce war with France and the war with the Barbary pirates, the navy won the favorable recognition of European nations and gained for the new republic considerable distinction. Nevertheless Congress again returned

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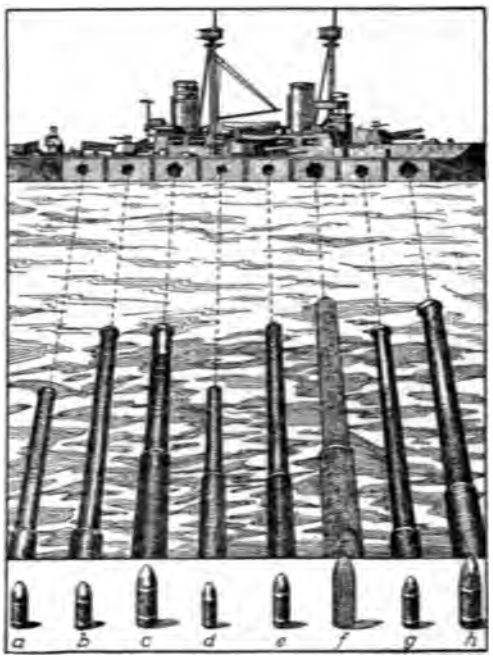
to its policy of neglect and at the close of Jefferson's administration the country was practically defenseless against a sea power. The approaching trouble with Great Britain caused renewed interest in providing the country with sea power, and during the War of 1812 the navy won world-wide distinction, owing chiefly to the superior skill of the gunners.

The War of Secession. Between 1815 and 1860 steam power replaced sails on all the important warships and the screw propeller finally replaced the paddle wheel. There was also improvement in ordnance and other equipment. At the beginning of the War of Secession the navy comprised ninety vessels, only forty-two of which were of service. The personnel consisted of 1,457 officers and 7,600 men. At the close of the war it included 7,500 officers and 51,500 men; 208 additional vessels were constructed and 418 were purchased. The development during this war which revolutionized naval construction was that of the ironclad ship of the Monitor type. The invention of the Dahlgren gun was likewise a great step in advance in armament. During the war the navy maintained an efficient blockade along 3,000 miles of coast, and captured or destroyed over 1,500 Confederate and British vessels.

The Navy of To-Day. The resources of the country were so nearly exhausted by the War of Secession that for a number of years the navy was neglected, and in 1881 it had only thirteen vessels of the first rating and these were constructed of wood. It had four ironclad ships of the third rate and a few Monitors, so that from a naval point of view the country was defenseless. This year the Secretary of the Navy secured an appropriation for the construction of a number of armored battleships, and since that date the plan to add two or more battleships each year, with the required number of auxiliary ships, has been practically followed, though the appropriations made by each Congress have varied in amount. In the Spanish-American War the navy rendered such efficient service as to win the commendation of all nations, and since the close of that conflict it has been greatly strengthened by the addition of seventeen ships of the dreadnaught type. Two of these—the *Pennsylvania* and the *Arizona*—at the time of their completion were the most powerful battleships in the world. In addition to the dreadnaughts there were, January 1, 1917, twenty-one pre-dreadnaughts which experts claim were superior to any ships of the same class in the navies of Europe. The dreadnaughts and pre-dreadnaughts are named after the states.

In August, 1916, Congress made an appropriation of nearly $453,500,000 for the construction of 156 naval vessels and one coast defense submarine, all to be undertaken before July 1, 1919.



NAVAL GUNS

Since 1914 information regarding navy building has been a matter requiring secrecy in every European country. In August, 1914, the following facts regarding the range and destructiveness of guns were known:

(*a*) 12-inch English, wire-wound gun; projectile weighs 850 lbs.; 47,000 foot-tons energy at muzzle; penetrates 11½ inches Krupp steel at 3,000 yards (nearly two miles).

(*b*) 12-inch English, wire-wound gun; projectile weighs 850 lbs.; 52,000 foot-tons energy at muzzle; penetrates 9 inches Krupp steel at 10,000 yards (about six miles).

(*c*) 13.5-inch English, wire-wound gun; projectile weighs 1,250 lbs.; 57,000 foot-tons energy at muzzle; penetrates 11 inches Krupp steel at 3,000 yards (nearly two miles).

(*d*) 11-inch German, Krupp gun; projectile weighs 760 lbs.; 42,500 foot-tons energy at muzzle; penetrates 11 inches at 9,000 yards (about six miles).

(*e*) 12-inch German, Krupp gun; projectile weighs 980 lbs.; 55,000 foot-tons energy at muzzle; very little is known about this weapon.

(*f*) 14-inch German gun; projectile weighs over 2,200 lbs.; muzzle energy and penetration unknown.

(*g*) 12-inch United States gun; projectile weighs 850 lbs.; 52,000 foot-tons energy at muzzle; penetrates 11 inches at 9,000 yards (about five miles).

(*h*) 14-inch United States gun; projectile weighs 1,400 lbs.; 65,600 foot-tons energy at muzzle.

Since that date the trouble with Germany has led to the construction of several hundred *submarine chasers*, a new type of ship which the development of the submarine has made neces-

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sary. While the ships and armament of the navy have been allowed to decline from time to time, this has never been true of the personnel of the American navy. From the organization of the navy to the present time thorough and systematic training has been required of both officers and men.

Naval Guns. The illustration shows the different sizes of guns in use in modern navies, together with their respective projectiles. The size of guns for battleships increases in proportion to the size of the ship, and now guns sixteen inches in diameter are employed on the largest dreadnaughts. All large guns are mounted on carriages which are operated by electric or hydraulic power. They are breech-loading and are fired by electric percussion. These guns and all mechanism connected with them have been brought to such a degree of perfection that they are fired with incredible rapidity. A 16-inch gun can fire two shots a minute; a 15-inch, two and one-half per minute, and a 14-inch, three shots per minute. Smaller guns are fired still more rapidly. For a description of large guns, see ARTILLERY.

Navy Yards. Navy yards for the construction and repair of vessels are maintained at New York (Brooklyn); Boston; Portsmouth, N. H.; Norfolk, Va.; Philadelphia; Mare Island near San Francisco; Washington, D. C.; Bremerton, Wash.; Charleston, S. C., and New Orleans. There are naval stations at Key West, Fla., and in our outlying possessions at Samoa, Guam, the Philippines, Honolulu and Guantánamo, Cuba. These stations serve as naval bases for supplies and making minor repairs.

Organization. Under the Constitution the President is commander-in-chief of the navy, but the administration of its affairs are in the hands of the Secretary of the Navy, who is at the head of the department of the navy. The office of Chief of Naval Operations was created in 1915, and is filled by appointment by the President with the concurrence of the Senate, from the officers of the navy not below the rank of captain. This officer, under the direction of the Secretary of the Navy, has charge of the operations of the fleet and with the preparation of plans for its use in war. (See NAVY, DEPARTMENT OF THE, page 4099.)

Other Powers

Since the beginning of the War of the Nations the Powers engaged in the war have taken special care to keep secret matters pertaining to the increase or the movements of their respective navies. We do not know, for instance, how many ships have been added to the British navy since 1914, but the announcement was made in Parliament in February, 1917, that the estimates for 1918 carried provision for a personnel of 400,000 men. The following table includes such information as was obtainable:

It has long been the policy of Great Britain to maintain a navy equal or superior to those of any other two powers, and since the destruction of the Armada (which see) that government has been mistress of the seas. In the order of their importance follow Germany, the United States, France, Japan, Russia, Italy and Austria-Hungary. The navies of other powers are insignificant in comparison with these. Argentina, Brazil and Chile are the only South American countries having navies.

COMPARATIVE STRENGTH OF THE NAVIES OF THE WORLD, 1916

POWERS	Battleships Dreadnaughts	Battleships Pre-dreadnaughts	Coast defense vessels	Battle cruisers	Armored cruisers	Cruisers	Destroyers	Torpedo boats	Submarines	Personnel, officers and men
Great Britain	36	40	..	10	34	91	188	49	97	151,000
Germany	20	20	2	8	9	46	154	...	?	79,000
United States	17	25	4	..	10	15	74	6	75	58,000
France	12	18	1	..	20	9	87	135	86	64,000
Japan	6	13	2	4	13	13	52	27	15	55,700
Russia	8	7	2	4	6	17	135	14	49	52,500
Italy	10	8	..	..	9	8	51	70	27	40,000
Austria-Hungary	8	6	6	..	2	10	18	63	12	19,500

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Related Subjects. The following articles in these volumes are closely related to the above:

Admiral	Naval Schools of Instruction
Admiralty	Privateer
Army	Rank in Army and Navy
Blockade	Submarine
Commodore	Submarine Mine
Gunboat	Torpedo
Marine Corps	Torpedo Boat
Naval Academy, United States	War of the Nations
Naval Observatory	Warship
Naval Reserve	

NAVY, DEPARTMENT OF THE, the executive department of the United States government which has complete charge of the navy. Naval affairs were under the control of the Secretary of War until 1798, when a separate department was organized. At its head is a member of the Cabinet, called the Secretary of the Navy, who is appointed by, and holds office at the pleasure of, the President. George Bancroft and Gideon Wells are the most distinguished of the men who have held this office. To help the Secretary in his task of general supervision there is one assistant secretary, whose most important duties cover such subjects as naval stations in the island possessions, the marine corps, and the building of ships in navy yards.

The work of the department is further divided among a number of bureaus and special officers. The heads of the bureaus are appointed by the President nominally for four years, and during their term of office rank as rear-admirals, although they may not actually have reached that grade. The names of the bureaus explain the subjects over which they have control—yards and docks, equipment, navigation, ordnance, construction and repair, steam engineering, medicine and surgery, and supplies and accounts. Most of the bureau heads are called *chiefs,* but the surgeon-general is in charge of the bureau of medicine and surgery, and the paymaster-general, of the bureau of supplies and accounts. The office of the judge-advocate general is independent of the bureaus, and its head has charge of courts-martial, special inquiries and legal matters generally relating to the department. The chief of navigation, among other duties, has charge of the Naval Academy at Annapolis and the war college at Newport; and the chief of equipments has nominal supervision of the naval observatory and the hydrography bureau, which prepares charts and maps. These numerous officials in practice constitute an advisory board for the Secretary of the Navy, but he occasionally disregards their suggestions. W.F.Z.

For the organization of the navy itself, see NAVY. For the relative importance of a United States Cabinet officer, see CABINET.

NAZ'ARETH, a town in ancient Galilee, where Jesus spent his early youth. It was a small town, because of the limited water supply; there was but one spring in the entire village. There is no mention of Nazareth in the Old Testament, which proves that the town was little known, and Nathanael expressed the general contempt and depreciation of the time when he asked, "Can there any good thing come out of Nazareth?" (*John* I, 46).

For some centuries after Christ, Nazareth continued to be obscure, but about A.D. 600 it became a place of pilgrimage. The present town, called En Nasira, has a population of approximately 11,000—far in excess of that of Biblical times—and contains the Latin church of the Annunciation, on the supposed site of Mary's house.

NAZARITE, *naz'a rite,* the name given in Biblical times, and in the first few centuries after Christ, to men or women who consecrated themselves to God. The Nazarite might set his own term of consecration, during which he was not to drink wine, shave or touch a dead thing. At the expiration of his vow, the Nazarite made sacrifices, shaved, burned his hair, and might again drink wine. Beside these temporary Nazarites, there were Nazarites for life. John the Baptist was made a Nazarite at his birth, and Samuel and Samson, in the Old Testament, were lifelong Nazarites. The word is derived from the Hebrew verb *nazir,* meaning *to consecrate.*

NAZIMOVA, *na ze'mo va,* ALLA (1879-), a Russian emotional actress who has achieved her great triumphs in Ibsen's plays. She was born at Yalta in the Crimea. When twelve years of age she entered the Conservatory at Saint Petersburg (now Petrograd), to study the violin, but later chose a dramatic career. She made her début in London in 1905 in a Russian play, *The Chosen People,* which first brought her talents before the English-speaking world. Although the language was practically unknown to her, in May,

ALLA NAZIMOVA

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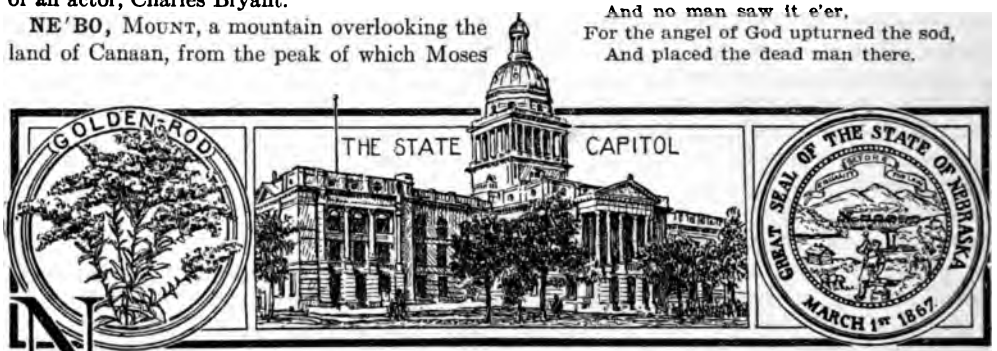
1906, she signed a contract to play in English in November of that year. Perseverance, hard study and close application enabled her to meet the terms of her contract, and she made her first appearance before a New York audience in Ibsen's *A Doll's House,* which was followed by *Hedda Gabler, Little Eyolf* and *The Master Builder.* A vaudeville tour in 1915, in which she appeared in a one-act play called *War Brides,* was highly successful and occasioned much favorable comment; in 1917 *'Ception Shoals* was equally well received, though the theme was morbid. When not busy on the stage Mme. Nazimova takes delight in landscape gardening; in private life she is the wife of an actor, Charles Bryant.

NE'BO, MOUNT, a mountain overlooking the land of Canaan, from the peak of which Moses saw the Promised Land, and on which he died and was buried (see *Deuteronomy* XXXII, 49). Mount Nebo is supposed to be Jebel Neba, a ridge eight miles east of the mouth of the Jordan River, on the eastern shore of the Dead Sea, near its northern end, and may have been a shrine of the Babylonian and Assyrian god, Nebo. The burial of Moses is the theme of a poem by Cecil Frances Alexander, a stanza of which follows. The poem succeeds well in giving an atmosphere of loneliness and awe:

On Nebo's lonely mountain,
  By this side Jordan's wave
In a vale in the land of Moab,
  There lies a lonely grave.
And no man made that sepulchre,
  And no man saw it e'er,
For the angel of God upturned the sod,
  And placed the dead man there.



NEBRAS'KA, the TREE-PLANTER STATE, a prairie state of great agricultural wealth, a region of golden fields of corn and grain and great, grassy plains, belonging to the north-central group of the United States. Its name is derived from a North American Indian word meaning *broad water,* which was given to the large river of the state, commonly known by its French name, the Platte, also meaning *shallow water.* The goldenrod, so abundant in Nebraska fields, has appropriately been chosen the state flower.

Size and Location. Ranking fifteenth in size among the states of the Union, Nebraska has an area of 77,520 square miles, which is only slightly less than that of South Dakota. The state is rectangular in shape, except where cut off on the southwest corner by Colorado and on the eastern border by the Missouri River. Its length from east to west is more than twice its width from north to south.

People. With a population of 1,192,214, averaging 15.5 per square mile, in 1910, Nebraska ranked twenty-ninth among the commonwealths of the United States. On January 1, 1917, the population was estimated by the Census Bureau at 1,277,750. About one-third of the foreign-born whites are from Germany. There are over 7,500 negroes in the state, and in 1915 there were 3,917 Indians in the state reservations, chiefly of the Omaha, Sante Sioux, Winnebago and Ponca tribes.

A large proportion of the population live in the southern and eastern counties, and the arid section of the west is very sparsely settled. Almost three-fourths of the inhabitants live on farms or in rural communities, and there are only five cities having a population of over 10,000. Omaha, of which the estimated number of inhabitants in 1917 was 165,470, is the largest city, followed by Lincoln, South Omaha, Grand Island and Hastings.

Only about thirty per cent of the inhabitants of the state are church members. Over one-fourth of these are Roman Catholics, and the Methodist, Lutheran, Presbyterian, Christian, Baptist and Congregational denominations are next in order in numerical strength.

Education. The efficiency and excellence of Nebraska's school system is shown in the fact that the percentage of illiteracy (1.9) is lower than that of any other state in the Union, except Iowa and Oregon. Special attention has recently been given to agricultural training in

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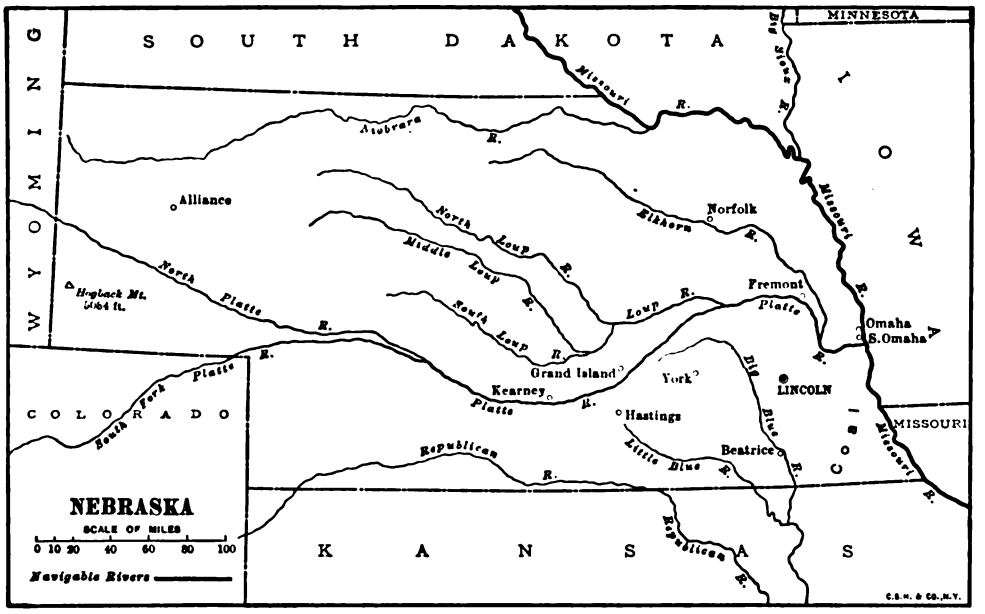

OUTLINE MAP OF NEBRASKA
Showing the boundaries, chief rivers, principal cities, and the highest point of land in the state.

the high schools, and since 1913 qualified high schools have given instruction in agriculture, manual training and domestic science. Textbooks are furnished by the state. The school fund is derived from the sale of public lands, state and local taxation, fines and forfeitures. The expenditure for public schools is over $10,000,000 a year.

The state maintains normal schools at Peru, Kearney, Wayne and Chadron, and a university at Lincoln (see NEBRASKA, UNIVERSITY OF). Other institutions of higher education, all of which are coeducational, are Bellevue College at Bellevue; Cotner University at Bethany; Union College at College View; Doane College at Crete; Grand Island College at Grand Island; Hastings College at Hastings; University of Omaha at Omaha; Nebraska Wesleyan University at University Place; York College at York. There is an agricultural school at Curtis and the United States maintains a school for Indians at Genoa.

A state board controls institutions of charity and correction, including schools for the blind at Nebraska City; an industrial school for juvenile delinquents at Kearney; an institution for the deaf and dumb at Omaha; asylums for the insane at Lincoln, Norfolk, Ingleside and Hastings; a hospital for crippled children at Lincoln; industrial schools for girls at Geneva and Milford; soldiers' and sailors' homes at Milford and Burkett; the penitentiary at Lincoln. In 1915 contract labor was abolished and instructive labor introduced in the state prison; all jails are required to provide labor for prisoners, if necessary hiring them to private persons. The care of neglected and dependent children is administered by a state board of control, and a public defender is employed by the state.

The Land. Nebraska lies in the region of the Great Plains at the base of the east slope of the Rocky Mountains. It rises uniformly from an elevation of 850 feet in the east, near the Missouri River, to the foothills and lofty, barren table-lands near the Wyoming border, which rise about 5,000 feet above the sea. In these hills are the highest peaks of the state, including Hogback Mountain, the highest point in the state, Wild Cat Mountain, Gabe Rock and Coliseum Peak, all rising above 5,000 feet. This northwestern part of the state consists of sand hills, Bad Lands and rough plains, where there is

> * * * * * buffalo grass and the sage grass dry,
> In the hot white glare of a cloudless sky,
> And the music of streams is never heard.

Pine Ridge, a line of fantastically-shaped cliffs and buttes, gashed by cañons and bare of vegetation, extends across the northwest corner of the state. None of the shaftlike peaks or flat-topped hills of this region are of impressive grandeur, but in the wooded foothills, espe-

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cially along the Snake and Niobrara river cañons, the scenery is picturesque and beautiful, and precipitous cliffs rise ninety feet above the waterfalls in the Niobrara near Valentine.

The Bad Lands of South Dakota extend into the northwest corner of Nebraska. They are rough plains of clay and slag, oddly formed and seamed by the action of wind and rain, and bare except for pockets of grass which are used as pasture land. East of the Bad Lands and north of the Platte River are the sand hills. In some places these hills rise in tiers, and except for hollows scooped out by the winds, they are covered with grass. The water absorbed by their porous, spongelike soil breaks out into many streams, springs and lakes.

In the central part of the state are great grassy prairies merging into the fertile farm lands of the eastern section, where, extending mile after mile, there are gently-rolling corn and grain fields, intersected by many streams.

Rivers and Lakes. The Missouri flows between wooded bluffs along the entire eastern border, and with its tributaries it drains the state. Its largest branch is the Platte River, crossing the state just south of the center and fed by the Loup and Elkhorn rivers and many small streams. In the south-central part of the state it divides, forming two branches, the North Platte, rising in Wyoming, and the South Platte, entering Nebraska from Colorado. The Niobrara, another large tributary of the Missouri, drains the northern part of the state, and the Republican, a branch of the Kansas, flows for some distance through the state just within the southern boundary. With the exception of the Missouri and the Niobrara, the rivers are slow and shallow.

Underlying much of the surface there is an unlimited supply of water which has percolated through the loose soil, and artesian wells are widely distributed. The "blowing-wells," or "weather-wells," found south of the Platte, are peculiar, for they "blow" or "suck" with the varying atmospheric pressure. Many of the wells furnish power for industrial and irrigation plants. There are numerous lakes and springs in the sand hills, and many small lakes and ponds border the Missouri, Platte, Elkhorn, Big Blue and other rivers.

Climate. The Nebraska skies are generally cloudless, the atmosphere dry and rare and the climate exhilarating. Although summer nights are cool, the glaring heat of midsummer days is disagreeable and the Gulf winds are oppressive. The temperature at times rises above 110° F. Extremes of cold also occur, and the winters though bright are generally severe. The snows are light, but an occasional blizzard from the Northwest strikes the state, causing damage among the herds on the open plains. In the extreme western part of the state the annual rainfall averages but twelve inches, and the whole west section is arid, but the rainfall in the east is sufficient for agricultural purposes. Nebraska is fortunate in receiving its rain during the growing season, and though the amount is comparatively small, it is effective. The annual precipitation averages twenty-three inches.

Agriculture. Nebraska is covered with a mantle of fertile soil and it is preëminently an agricultural state. In the eastern section great crops of Indian corn, wheat and oats are produced, and in the west and northwest regions, grasses grow in abundance; where the land is irrigated, other crops can be raised. In 1910 about three-fourths of the total land area was in farms. Corn is by far the most important crop, in the production of which Nebraska is surpassed only by Iowa, Illinois, Missouri and Indiana, in average years (see CORN).

Wheat, oats, alfalfa and other hay, potatoes, rye and barley are other large crops. In the production of wheat Nebraska rivals Minnesota, but is exceeded by North Dakota and Kansas. In the output of alfalfa the state is surpassed only by Kansas. Apples are the most important of the orchard fruits, though over 100,000 bushels of peaches and nectarines and nearly as large a quantity of cherries are produced. Grapes and small fruits, especially strawberries and blackberries, are also grown. Nebraska ranks fifth among the states in the value of its crops.

A greater variety of hay and forage is grown here than in any other state in the Union, and the vast pasture lands on the west and large crops of hay and corn of the eastern section furnish an abundance of feed for live stock, which is raised for the market. The value of the live stock of the state averages over $170,000,000 yearly, placing Nebraska among the leading states in the value of animal products.

Irrigation. Irrigation is a fundamental problem in the development of the western part of the state. In many places wells supply the water, and in the sand hills the lakes furnish a source of water supply for irrigating systems. All irrigation projects, either completed or under way, include the watering of 951,000 acres.

Forests. Less than two per cent of the land area is woodland, but the state has been very

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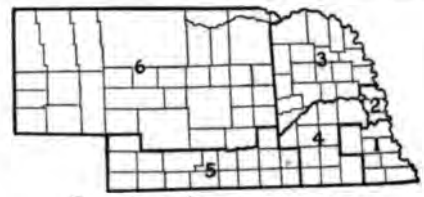
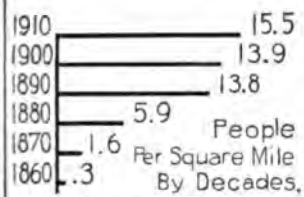
NEBRASKA

Library of State University

Irrigated Area.

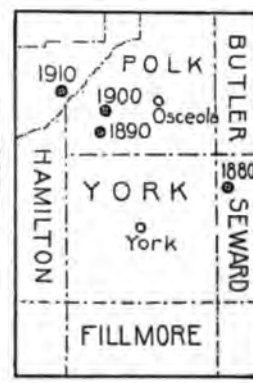


Congressional Districts

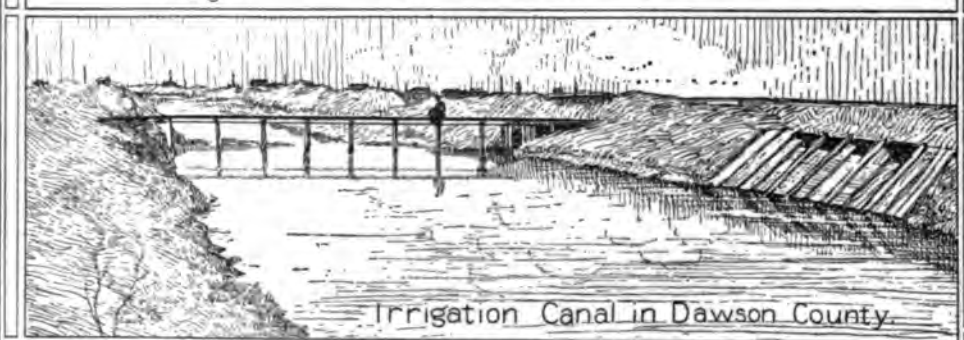


People Per Square Mile By Decades.

J. Stirling Morton
Father of Arbor Day.



Center of Population.



Irrigation Canal in Dawson County.

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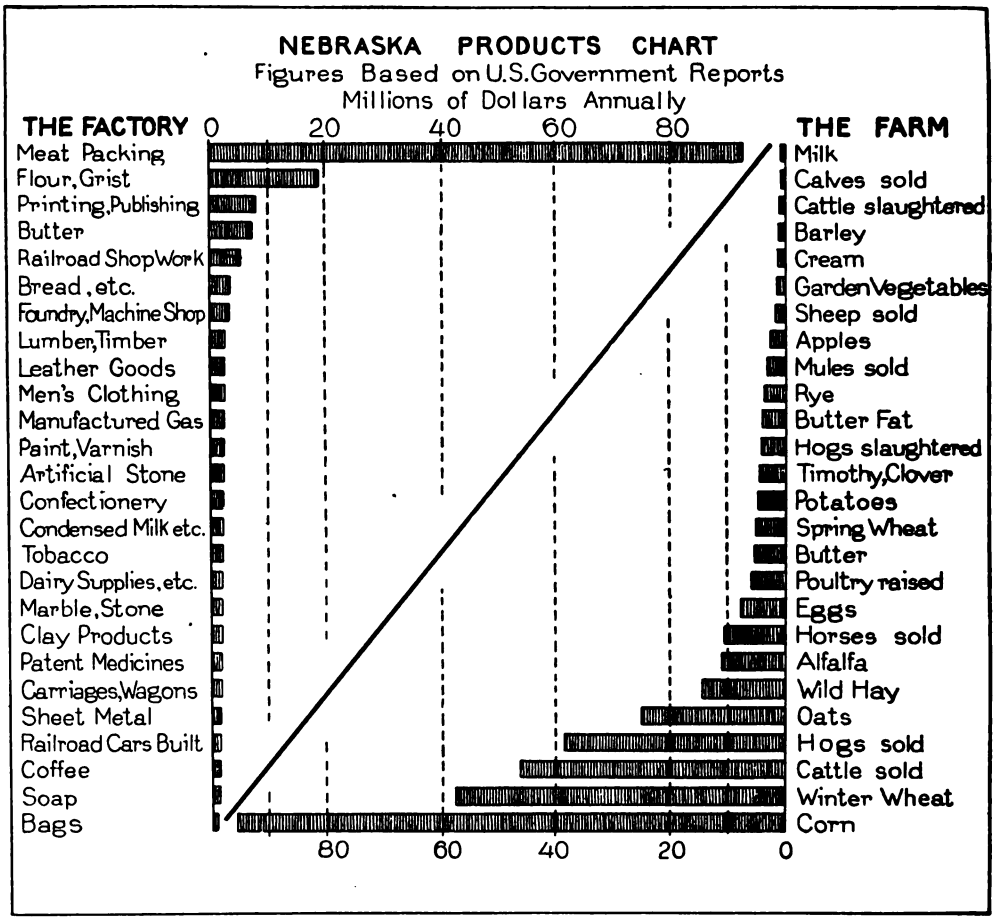

active in the forestation of its waste lands and prairies, and has so won its popular name of *Tree-Planter State*. Arbor Day (which see), now observed generally throughout the country, originated in Nebraska in 1872. All of the well-known trees of the north latitude are grown in the eastern part of the state; the bull pine grows in the highlands of the northwest; pines, cottonwoods and willows are being propagated in the sand hills, and red cedars border the streams.

Minerals. Nebraska is of little importance as a mineral state. A superior quality of clay of all colors for brick; a soft building stone; chalk rock used in the manufacture of hydraulic cement; pumice, sand, gravel, ocher, peat, lignite and mineral waters are produced. Metals are found, but in such small quantities as to be of no economic value.

Manufactures. Agriculture is not only the chief industry, but it is the basis of the state's manufactures and commerce. Being in the center of the cattle-raising and corn districts, slaughtering and meat packing, the chief industry of the United States, is by far the most important industry of the state. South Omaha, as a packing center, is outranked only by Chicago, and by the twin cities in Missouri and Kansas, each known as Kansas City. Nebraska wheat makes an excellent flour, and flour mill and gristmill products are second in importance. Printing and publishing, the making of malt liquors, car repairing and shop construction by the steam railroads, the production of foundry and machine-shop products, the manufacture of beet sugar, lumber and timber products and leather goods, vegetables, canning and dairying are also important. The creamery at Lincoln is one of the largest in the United States. Omaha, Lincoln, South Omaha and Grand Island are the largest manufacturing centers of the state. In 1910 Nebraska ranked twenty-fifth among the states in the value of its manufactures.

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RESEARCH QUESTIONS ON NEBRASKA

(An Outline suitable for Nebraska will be found with the article "State.")

Which of the following states are smaller than Nebraska: Alabama; Idaho; Georgia; Illinois; Kansas; Oklahoma; Minnesota; New York; Arkansas; Colorado; South Dakota?

Which of the following have a larger population: Washington; South Carolina; Maryland; Connecticut; Kansas; Colorado?

What two names are given to one of the largest rivers of the state? What similarity is there in the meaning of these names?

What is the state flower?

How many states were admitted to the Union between the close of the Revolutionary War and the admission of Nebraska?

Has this state more or fewer people to the square mile than the country as a whole? Than the Canadian province of Ontario? Than each of the states upon which it borders?

What other states were, in part at least, created from territory that originally formed part of Nebraska?

Why is not the western part of the state as thickly settled as the eastern? Does the larger part of the population live under rural or under urban conditions? What is the Indian population?

Of what territories has this region formed, governmentally, a part? What class of people was for a time forbidden to settle in Nebraska? Why?

In how many of the states can a larger percentage of the people read and write?

How does the school system help the former?

What impression of the western part of this state was drawn from the accounts of the early explorers?

About how much higher is the loftiest point in Nebraska than the lowest? Is its greatest altitude higher or lower than that of Minnesota? Of Kansas? Of each of the states upon which it borders?

What stand has the state taken on the liquor question?

How large must a city be before it can make its own laws?

What are the Bad Lands? Why are there many springs, streams and lakes in the region of the sand hills?

What is the railway mileage to each hundred square miles of area? How does the state compare in this respect with its neighbors on all sides?

What is there peculiar about the "blowing-wells" of Nebraska?

What is the main manufacturing industry of the state? How many cities in the country surpass in value of products of this industry the chief center in Nebraska?

What is there especially fortunate about the rainfall of this state? What is the pleasantest feature of the climate?

What holiday, now of national importance, originated in this state? What has the popular name of the state to do with this fact?

How many states surpass Nebraska in the production of its chief crop? How many surpass it in total value of crops?

How many square miles are included in the area irrigated or to be irrigated by projects already planned?

What Indian tribes are represented in the state?

How many constitutions has Nebraska had?

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Transportation. There are good facilities for railroad transportation in the eastern and more thickly settled part of the state, but the western section has only one line extending from north to south. Three important railroads, the Chicago, Burlington & Quincy, Union Pacific and Chicago & North Western, cross the state from east to west. Other important lines are the Missouri Pacific; Chicago, Rock Island & Pacific; Chicago, Saint Paul, Minneapolis & Omaha; Saint Joseph and Grand Island. There are over 6,200 miles of steam road and 230 miles of electric railway in the state. All railroads are controlled by the state railway commission. Only three-tenths per cent of the public roads are improved. The Missouri River, extending 500 miles along the eastern border, is not navigable in this part of its course, and is practically of no commercial importance except at Omaha and Sioux City.

Government and History

Nebraska has had two constitutions, adopted in 1867 and 1875. Amendments may be proposed in either house of the legislature or by the people, but to become effective must be adopted by three-fifths of the members of each house and a majority of voters. Every male citizen twenty-one years of age and all those of foreign birth who have declared their intention of becoming citizens, thirty days preceding the election, are entitled to vote if they have been residents of the state six months immediately preceding elections. A preference may be expressed in the vote for President, Vice-President and United States Senators.

The *legislative body* consists of a senate and house of representatives, elected biennially. The senate consists of twenty-eight members, and their number is never to exceed thirty-three; the house of representatives, in which there are now seventy-seven members, is never to exceed 100 in membership. The initiative and referendum are in full force.

The *executive authority* is vested in a governor, lieutenant-governor, secretary of state, treasurer, attorney-general, superintendent of public instruction and commissioners of public lands and buildings, all of whom are elected for terms of two years. The treasurer is not eligible to three successive terms. Since 1915 it has been the governor's duty to present a budget of the revenues and expenditures for the ensuing biennial period.

The *judicial department* comprises the supreme court, six district courts, county courts, justices of the peace, police magistrates and such inferior courts as are created by law.

When the voters in a county approve, the county may organize townships. No new county may be created having an area of less than 400 square miles, and no county may be reduced to less than that area. Cities of 500 to 100,000 inhabitants may frame their own governments. The sale of intoxicating liquor is prohibited in all sections of the state, in accordance with a referendum vote taken in November, 1916. Previous to this there were stringent regulations which required early closing of saloons in cities. In 1920 the women of Nebraska for the first time will vote for electors of the President and Vice-President of the United States, in accordance with a law passed in 1916.

Territorial Government. There are stories that Coronado, in his search for the famous seven cities of Cibola, reached the southern boundary of the present state of Nebraska, and that Marquette passed the mouth of the Platte River in 1673, but the first known settlement was not founded until 1807, when a fur-trading post was established at Bellevue. The territory had been included in the Louisiana Purchase and had been visited by Lewis and Clark in 1804. Pierre and Auguste Chouteau, fur traders from Saint Louis, explored the Platte in 1807. In 1819, Stephen Long followed the Platte across the state, and his discouraging description of the semiarid plains of the western part of the present state gave rise to the myth of the Great American Desert.

After the founding of Bellevue, trading posts were established at Nebraska City and Omaha by the American Fur Company. When Missouri was made a state in 1821, Nebraska, which had been a part of Missouri Territory, was left practically without a government. In 1834 it was divided into three parts, one being included in Arkansas Territory, another part joined to the Territory of Michigan and a third part being placed under the jurisdiction of Missouri. The Territory was reserved as "Indian Country," and though settlement by whites was forbidden, some of the thousands of gold seekers crossing this territory on their way to California remained in Nebraska. The civilized Indian residents during 1851-1853 unsuccessfully petitioned Congress to organize a territory, and in 1853 the residents formed a provisional gov-

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ernment. Nebraska then became the center of the struggle between the proslavery settlers of Kansas and the antislavery settlers of Iowa. In 1854 Douglas introduced a bill in Congress providing for the formation of two territories, Kansas and Nebraska, based upon popular sovereignty.

The Territory of Nebraska created by this bill extended from the Missouri River to the summits of the Rocky Mountains and from 40° N. latitude to British Columbia. The northern part of this region was included in Dakota Territory in 1861, a small section was joined to Colorado, and in 1863, when Idaho Territory was formed, Nebraska was practically reduced to its present limits. The territory was crossed by the Oregon, Old California and Old Salt Lake Trails, and by the famous "pony express" which extended from Saint Joseph, Mo., to Sacramento, Cal. Nebraska City became a great supply center for travelers over these routes. In the slavery struggle, Nebraska furnished 3,300 troops to the Union army, and after 1861 slavery was abolished in the territory.

Statehood. After being twice vetoed by the President, an act of admission was passed in 1867 and Nebraska was made the thirty-seventh state of the Union. The capital was moved from Omaha to Lincoln. Following the extension of the Union Pacific Railroad across the state, the land was "boomed" and prices were inflated, bringing about an economic collapse in the early nineties.

During its early history as a state, Nebraska favored Republican politics, but since 1896 the Democrats have increased in power, under the leadership of William J. Bryan. In the Presidential election of 1912, Woodrow Wilson received the majority of votes, and a Democratic governor, the second since 1892, was elected by a large majority. Several amendments were added to the constitution, including a provision for the initiative and referendum. In 1916 President Wilson carried the state for the Democrats, and a Democratic governor was elected. E.B.P.

Consult Sheldon's *History of Nebraska; Proceedings and Collections* of the Nebraska Historical Society.

Related Subjects. The following articles in these volumes will be of interest in connection with a study of Nebraska:

CITIES

Beatrice	Lincoln
Fremont	Omaha
Grand Island	South Omaha
Hastings	

HISTORY

Kansas-Nebraska Bill	Louisiana Purchase
Lewis and Clark Expedition	

LEADING PRODUCTS AND INDUSTRIES

Alfalfa	Hay
Cattle	Meat and Meat Packing
Corn	Oats
Dairying	Wheat

PHYSICAL FEATURES

Bad Lands	Platte River
Missouri River	

NEBRASKA, UNIVERSITY OF, founded in Lincoln, the state capital, in 1869, by act of the legislature, and opened two years later with the college of literature, science and arts. Some of the material for the oldest building, University Hall, was hauled in wagons from the Missouri River. This institution, which is at the head of the state educational system, comprises the graduate school, the college of literature, science and arts, the industrial college, which includes the schools of agriculture, mechanical arts and domestic science; the college of law; the college of medicine, the school of fine arts; the school of music, and the summer school. Tuition is free to residents of Nebraska except in the professional and art and music courses.

The control of the university is vested in a board of six regents. Funds are derived from a state tax, revenues from land grants, interest upon investments and tuition fees. The school of agriculture and an experiment station are located on a 320-acre farm about two miles east of Lincoln. Another university school of agriculture is located at Curtis, Neb. The experiment stations at Valentine, North Platte, Scotts Bluff and Culbertson are under university supervision. The medical school is located in Omaha. The university faculty numbers about 370, and the student enrolment is over 4,800. The library contains 124,000 volumes.

NEBUCHADNEZZAR, *neb u kad nez' ar,* an illustrious king of the Chaldean, or New Babylonian, Empire, in whose reign (605-562 B.C.) Babylon became one of the most splendid cities of the ancient world. He was the son of Nabopolassar, who founded the empire and thus paved the way for his son's renown. Much of the history of Nebuchadnezzar is related in the Bible, in *Kings, Jeremiah, Ezekiel* and *Daniel.* To punish the Jews for their repeated revolts, he laid siege to Jerusalem and in 586 B.C. captured that city. This date marks the end of the political life of the Hebrew kingdom, for the people were carried away by him into what is known as the "Babylonian Captivity"

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(see JEWS; JERUSALEM). Nebuchadnezzar also carried on a siege of the Syrian city of Tyre, but was forced to abandon it after thirteen years. An inglorious invasion of Egypt was another of his military exploits, but he shines in history as a builder rather than as a warrior. The Great Palace in the royal section of Babylon, the famous Hanging Gardens (which see), the walls encircling the city, magnificent fortifications and a great temple bore witness to his devotion to the art of building (see BABYLON). In *Daniel* IV is an account of a strange form of madness that came upon him in the height of his glory, whereby he was "driven from men, and did eat grass as oxen." Nebuchadnezzar died at the age of eighty-four, and with him passed away the splendor of the New Babylonian Empire (see BABYLONIA, subhead *History*).

NEB'ULA, a luminous, cloudy spot in the heavens. Many apparent nebulae were resolved into star clusters after the invention of the telescope, but that true nebulae are cloudy masses of luminous gas, and not clusters of stars, was finally established by Sir William Huggins (1864). About ten thousand nebulae are known, but only the two brightest, those in the constellations of Andromeda and Orion, are visible to the naked eye. Nebulae vary in form, the one in Andromeda being oval, that in Orion very irregular, and others being ring-shaped or spiral. The smaller nebulae usually are brightest in the center and approach the oval in shape. Several double nebulae have been identified and others have been noted that vary in brightness. With the perfection of the astronomical camera many interesting photographs of these luminous patches have been obtained.

NEBULAR HYPOTHESIS, *neb' u lahr hi poth' e sis,* a theory advanced by the French astronomer Laplace to account for the formation of the universe. According to him the sun and all the planets were formed of a nebula or cloud of intensely-heated gas, which under the action of gravitation assumed a globular form. The mass gradually condensed and decreased in size, while the velocity of motion increased. Its whirling motion tended to flatten the globular mass at the poles; the continuing contraction then caused rings of nebulous matter to become detached and be thrown off into space, as in the case of the rings of Saturn or the earth's moon. The matter detached eventually collected into a globe, which continued to revolve around the central nebula from which it was cast off, as the moon revolves around the earth.

This theory was first suggested by Swedenborg, and then by Kant, and later was elaborated by Laplace, with whose name it is now identified. He did not investigate the formation of the original nebula, but confined himself to theories describing the evolution of the universe from the nebulous mass. The whole hypothesis is based on the discovery of the rings of Saturn, which are regarded as planets in the process of formation.

Planetesimal Hypothesis. The nebular hypothesis is no longer generally accepted by scientists. Among the more recent theories that have claimed attention is the *planetesimal hypothesis* of Chamberlin and Moulton (University of Chicago). They conceive the solar system to have been formed from a spiral nebula composed of gas, carrying innumerable solid bodies called planetesimals. These bodies, moving around the center in varying orbits, tended to gather together into planets and satellites. See EARTH; GEOLOGY, subtitle *The Story of the Earth.*

NECHO, *ne' ko,* an Egyptian king who reached the throne about 610 B. C. and died in 594. During his reign the Jews came into conflict with the Egyptians; in the Biblical record this king is referred to as Pharaoh-Nechoh. It was he who killed King Josiah of Judah, who placed Jehoiakim on the throne, and who exacted a heavy tribute of Judah. Nebuchadnezzar encountered him later, and with his superior army overthrew the Egyptians and forced them to give up the conquered territory. In his home government Necho was more fortunate. He had a canal built from the Nile to the Red Sea, and he sent out a fleet to explore the coast of Africa.

NECK'ER, JACQUES (1732-1804), a French statesman and minister of finance during one of the most troubled periods in the history of his country. He was of Swiss family, born at Geneva, but in 1747 went to Paris, where he later engaged in the banking business and gained a large fortune. By reason of several publications on financial subjects he was in 1777 made director-general of finances, and in this office the general faith in his business ability enabled him to borrow large sums which for a time bettered the affairs of the country and relieved him of the necessity of imposing increased taxes. He held a distinguished social position in the life of the capital, but his publication of a statement as to the financial condition of France displeased the king, and in 1761 brought about his dismissal.

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He lived chiefly at Geneva until 1788, when he was recalled by Louis XVI to the offices of director-general of finance and minister of state. His part in the convening of the States-General increased his popularity, and his dismissal by the king in July, 1789, was the direct cause of the storming of the Bastille. This brought about his reinstatement, but he held office only until September, 1790, resigning because of the rejection of some of his financial schemes. Although an excellent business man, Necker had few of the qualities of a great statesman. Madame de Staël was his daughter (see STAËL-HOLSTEIN, ANNE LOUISE GERMAINE).

NECROMANCY, *nek'ro man si,* or the BLACK ART, is the exercise of an unhallowed power acquired by contact with the spirits of evil, which confers a control of supernatural forces. It was contrasted with *white magic,* which represents the more legitimate or beneficent use of like powers. Such beliefs go back to the oldest types of practices among primitive peoples, but were decidedly modified and attained their current meaning in connection with the popular interpretation of Christian dogma. See MAGIC; SUPERSTITION; WITCHCRAFT. J.J.

NECROPOLIS, *nek rop'o lis,* a word meaning *city of the dead* and thus a pleasing term for any large cemetery; but by literary usage it has become restricted in application to large cemeteries near centers of ancient civilization, from which the archaeologist gathers information concerning life and times of vanished people. The new world furnishes such a necropolis at Ancon, Peru, dating back to the days of Inca rule, from which most interesting details of native culture have been gathered. At Hallstatt, Austria, is a necropolis of the bronze age, thus long before the dawn of authentic history. The most of what is known of the Etruscans is derived from a study of their ancient cemeteries, of which those of Veii, Tarquinii and Clusium may be mentioned, all dating from centuries which preceded the rise of the Roman state.

But Egypt is preëminently the land of necropolises. The site of every center of royal authority in ancient Egypt, Memphis, Thebes, Sais, etc., marks the location of a necropolis. All pyramids and temples, not simply those of Gizeh alone, were surrounded by extensive cemeteries. Discoveries of far-reaching import are being constantly made in the same. They constitute the only source of information for times preceding the first dynasty at Memphis, probably 7,000 years ago.

NECTAR, *nek'tar,* in Greek mythology, the celestial drink of the gods, in which they pledged one another from cups brought by Hebe and Ganymede. It resembled red wine, and with ambrosia, the food of the gods, conferred youth, beauty and immortality.

NECTARINE, *nek'tar in,* or *nek tar een',* a fruit belonging to the rose family which has probably been developed, with the peach and almond, from a wild almond tree of Southwestern Asia. The nectarine is occasionally found on peach trees, merely as the result of bud variation. The tree grown from the seed of such fruit, almost without exception, "comes true;" that is, it bears nectarines. The smooth, glossy surface of the nectarine is its main difference from the peach. Although exported to some extent from California, its commercial value is not so great as that of the peach. The nectarine tree thrives in all regions in which the peach flourishes. See PEACH.

NEEDLE, *ne'd'l.* The next time you pick up a sewing needle, remember that this little piece of steel, with a fine point at one end and an eye at the other, has passed through the hands of seventy workmen and undergone twenty-two processes in its manufacture. The coils of wire are cut into pieces long enough for two needles. These pieces are then heated to a dull red and rolled on a flat steel plate to straighten them. The wires are then pointed at each end on a grindstone, being held in place by a device which causes them to revolve while in contact with the stone so that the points are fine and even. Only one end is pointed at a time. The next step consists in stamping the wires in the middle by a machine that forms the flat place for the eyes, which are punched by another machine. These pieces of wire have now become double needles, held together by a thin film. A wire is now run through the eyes and the needles are cut apart and the head or eye end is rounded and smoothed. The remaining processes consist in tempering, polishing, sorting and packing the finished product for the market.

Sewing needles are usually put up in papers of twenty-five each, and a dozen of these papers form a package. The sizes are indicated by numbers, and papers for general use contain several sizes. England is the chief center for the manufacture of sewing needles. They are also made in other European countries, France ranking next to England in their manufacture. The value of sewing needles imported into the United States in normal years is about $500,000.

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Sewing-machine needles are made in the United States. They have the eye near the point and a groove on one side for the thread. A crochet needle has a hook near the point. Some needles used in sewing shoes are curved, forming a part of a circle. Some needles used by surgeons are also curved. Thorns and pointed sticks were first used by the ancients, and needles of bone are still in use by uncivilized people. Stone needles have been found among the relics of the ancient Egyptians.

NEEPAWA, *ne'pa wa,* a town in Manitoba, the center of a rich agricultural district and an important railway junction point. It is a division point on the Canadian Northern Railway, and is also on the Canadian Pacific short line between Winnipeg and Edmonton. It is 134 miles west of Winnipeg, sixty-one miles west of Portage la Prairie and seventeen miles east of Minnedosa. The Canadian Northern shops, a large oatmeal mill, a machine shop, brickyard, creamery and sash-and-door factory are the principal industrial establishments. The town owns its waterworks and electric light system. The summer fair of the Northwest Agricultural and Art Association is held here. In the Riding Mountains, northwest of Neepawa, is an abundance of game. Population in 1911, 1,864; in 1916, 1,854.

NEG'ATIVE QUANTITY, a quantity taken in a sense opposite to that chosen as positive. For example, if a dollar owned be declared to constitute a positive quantity, then a dollar owed will be a negative quantity. If a number of degrees above zero on the thermometer be thought of as positive, the corresponding number of degrees below will be negative, and so on. The mathematician has considerable use for such fictitious negative quantities, which he indicates by the symbol —. In the mathematical expression 6—8, an impossible operation is indicated, if we think only of positive quantities. The mathematician meets this difficulty by supposing numbers to exist below zero and to be of such a character that, when they are added to positive numbers, the latter are caused to diminish instead of being increased. (For example, —6 added to +8 gives a result of 2, or +2.) He conceives such negative numbers to proceed from zero to infinity. The operations and principles involved in the solution of problems containing negative quantities are explained and illustrated in the article ALGEBRA. See, also, NUMBER.

NEGAUNEE, *ne gaw'ne,* MICH., a center of the iron-mining industry, situated in Marquette County, near the northern coast of the Upper Peninsula, twelve miles southwest of the city of Marquette and three miles east of Ishpeming. It was in this locality that the iron ore of the Lake Superior region was first discovered; the ore was mined here as early as 1854, more than twenty years before any other range in this region was opened. Negaunee is located about 1,450 feet above the surface of Lake Superior, on a ridge called the Iron Mountain, where the deposits of ore are extensive and of good quality. There are several highly productive mines within the city's limits. The place was settled in 1846, was incorporated as a village in 1865 and received its city charter in 1873. The Chicago & North Western, the Duluth, South Shore & Atlantic and the Lake Superior and Ishpeming railroads serve the city. In 1910 the population was 8,460; it had increased to 9,416 by 1916 (Federal estimate). The area of the city is nearly fourteen square miles.

NEGLIGENCE, *neg' li jens.* A railroad company engaged John Smith to guard a dangerous crossing in a city. Smith entered a near-by store and failed to warn an automobile of an approaching train. The automobile was struck, and those in it were seriously injured. Because Smith failed to do his duty he was convicted in court of *gross negligence.*

Mr. A set fire to some brush on his land on a windy day in time of drought. The wind was blowing towards B's house on an adjoining farm; brands from the burning brush set B's house afire, and it was destroyed. The court ruled that A failed to use ordinary caution in setting fire to the brush under existing conditions and that B was entitled to damages.

Negligence, in law, is failure to do what a man of ordinary judgment and prudence would do, when it is evident that such omission will result in injury to another; or it is failure to do what a contract specifies should be done. Smith omitted to do the thing he was hired to do and A was grossly careless or negligent in setting fire to his brush. Negligence presupposes legal obligations which warrant the injured party in bringing suit for damages, but the burden of proof rests with the party bringing the suit. When the case is so clear that there is no doubt of the negligence of the defendant the case may be decided by the court, but the determination of the fact of negligence is usually left to the jury. When evidence shows that the defendant was not negligent the case is dismissed. If the plaintiff was contribu-

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tory to the negligence of the defendant he cannot recover. Had Smith warned the automobile, and had the driver attempted to cross the track regardless of the warning, his act would have been considered as *contributory negligence,* and the railroad company would not have been liable.

Consult Shearman and Redfield's *Treatise on the Law of Negligence.*

NEGOTIABLE, *ne go' shi a b'l,* **PAPER,** written contracts payable to order or bearers, and treated as security for, or representative of, money. Negotiable paper may be transferred by endorsement or delivery, and the receiver or assignee of the contract has a claim in his own name and without notice against the maker. The best-known form of negotiable paper is the bank check, which was also the latest to come into general use. A check may pass through the hands of an indefinite number of persons, each of whom accepts it in place of money. Any holder of the check may claim payment from the maker. In addition to checks the commonest forms of negotiable paper are drafts and bills of exchange, promissory notes, bank, exchequer or treasury notes, and government and corporation bonds. The pass book of a savings bank, however, is not transferable.

Its Characteristics. As defined above, negotiable paper must be payable *to order* or *to bearer.* In other words, if John Doe makes a note payable to "Richard Roe," the note is not negotiable and Richard Roe is the only one who can collect it. If, on the other hand, the note is payable to "Richard Roe, or order," the note may be transferred. Negotiable paper represents money, not goods. A bill of lading or a warehouse receipt, on the contrary, represents commodities. By the laws of most civilized countries a bill of lading may be assigned while the goods are en route, or a warehouse receipt while the goods are in storage, but such paper is not negotiable, for it does not represent money and cannot perform the functions of money. This difference is most important in the transfer of ownership, for the ownership of negotiable paper is vested in the holder. This means that a thief or finder can convey perfect title to negotiable paper, but if he conveys a stolen bill of lading the purchaser or assignee gets no better title to the goods than he would if he received the stolen goods.

How Title Is Transferred. A negotiable instrument may be transferred either by endorsement or by delivery. A check, for example, if made payable to bearer, may be transferred merely by delivery. It is customary, however, to endorse even such paper as is payable to bearer.

Endorsement. An endorsement or indorsement, in its broadest sense, is any writing on the back of a paper; the word comes from the Latin *in dorso,* meaning "on the back." In a technical sense the term applies only to the signature or other writing which indicates the transfer of a negotiable instrument. Ordinarily such writing is on the back, but it is legal if made on the face of the instrument.

An endorsement may be written in a variety of ways. If the holder of the paper merely signs his name, the endorsement is said to be *in blank.* A *special endorsement* or an *endorsement in full* specifies the person to whose order payment is to be made, thus: "Pay to A. B., or order, (Signed) C. D." Another form of endorsement is called *restrictive,* because it restricts further negotiation, thus: "Pay to First National Bank, only." Modern English and United States law emphasizes the negotiable character of the instrument, and the party who is required to pay may disregard any conditional endorsement, whether or not the condition has been fulfilled, and may pay the required amount to the endorsee.

Ordinarily every endorser of a negotiable instrument is liable for its face value if the maker is unwilling or unable to pay it. If the endorser wishes to avoid this liability he may add the words "without recourse." This form of endorsement does not affect the validity of the paper or prevent further endorsement. A.E.R.

Consult Tompkins' *The Law of Commercial Paper;* Ogden's *Law of Negotiable Instruments.*

Related Subjects. The reader is referred to the following articles in these volumes:

Bill of Exchange	Check
Bill of Lading	Draft
Bond	Note

NEGRITOS, *ne gre' tohz,* a negroid race found chiefly in the Philippines, the Andaman Islands and the Malay Peninsula. They form one division of the pygmies, people whose most pronounced characteristic is their short stature. For details, see PYGMIES.

NE'GRO, from the Latin *niger,* meaning *black,* the name properly applied to the native races of Africa, excepting the Egyptians, Berbers, Abyssinians and, some authorities insist, the Hottentots. The term *negro race* is generally used as synonymous with *African race,* but such a designation is not strictly true. The characteristics of the negro race are a dark skin,

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woolly hair, a flat nose, thick lips and a tall body, with long arms and legs. Africa from the Sudan southward to the Tropic of Capricorn is the native land of the negro, but these people have been carried to nearly all parts of the globe. In 1619 twenty negroes were taken to the American colonies and sold as slaves. Previous to this the Spaniards had brought negroes to the West Indies and sold them into slavery. The project was successful from a financial viewpoint, and the importation of negroes into the United States continued until 1808, when it was prohibited by the Constitution. At the close of the War of Secession there were about 4,000,000 negroes in the United States, and their numbers have continued to increase; in 1910 there were over 9,800,000 in the country. Cuba, Haiti, San Domingo and Jamaica have a large proportion of negroes among their population.

Education of the Negro. During the period of slavery, no effort was made by the Southern states to educate the negro, and the problem was not seriously presented until the issue of the War of Secession had made of him a citizen. Church societies of the North initiated educational work, the teachers being very largely young men and women from that section. Of such institutions, Hampton Institute, established in 1861, may be regarded as typical. Independent instruction was supplemented by governmental agency during the five years' life of the Freedmen's Bureau, which was opened in 1865. Many wealthy men gave generously to the cause.

Experience soon showed that the best instructors of the negro were men of his own race, who understood his temperament and his needs. To train such instructors a number of normal schools and colleges were opened in the decade following 1868. Men like Booker T. Washington appeared, the natural leaders of their people. With a more intimate knowledge of the economic and social needs of the colored people, they never ceased to emphasize the wisdom of specific industrial training, and they had little difficulty in showing that the traditional bookish drill of the white schools must be greatly modified. Within recent years the negro schools of the South have devoted most of their efforts to training their students to take a part in the agricultural and industrial development of the country. They have not tried to turn out scholars trained in Greek and Latin and the other so-called cultural studies, but skilled farmers and mechanics. As a result of such methods not only have the negroes developed greater efficiency and self-reliance, but the stubborn opposition which the first educators of the negro had to encounter has subsided also. In some parts of the South negroes trained in the newer industrial schools have formed flourishing communities of their own.

It may be said that the status of the negro in the South is now more encouraging than it has been at any previous time since the War of Secession. Free public schools for the negro exist in all the Southern states, and public-spirited men from the South have united with those of the North in organizing the General Educational Board and the Southern Educational Board to promote the training of the negro for citizenship and life. The influence of such higher institutions of learning as Fisk University at Nashville, Howe University, Atlanta University, and the normal and industrial schools at Tuskegee and Hampton, permeates the entire educational fabric and is rapidly establishing new ideals and aims for the children and grandchildren of former slaves.

The total enrolment of colored children in schools of the South is about 1,770,000, over half the colored school population. About 25,600 students are taking secondary courses, and nearly 30,000 are enroled for collegiate and professional courses. G.B.D.

Consult DuBois's *The Souls of Black Folks;* Dennett's *Nigerian Studies;* Washington's *The Study of the Negro.*

Related Subjects. The reader is referred to the following articles in these volumes:

Freedmen's Bureau	Slavery
Hampton Normal and Agricultural Institute	Tuskegee Normal and Industrial Institute
Peabody Education Fund	War of Secession
Slater Fund	Washington, Booker T.

NE'GUS, the native title of the king or emperor of Abyssinia, his full title being *negus negusti,* meaning *king of kings.* Negus is also the name of a drink common in the early part of the eighteenth century, and named after its inventor, Colonel Francis Negus (died 1732). It was usually made of port, mixed with a little lemon juice, sugar and hot water.

NEHEMI'AH, a Jew born during the Babylonian captivity, and as a youth cupbearer to Artaxerxes, king of Persia. Having besought the king with regard to the unprotected state of his kinsmen in Judea, he was made governor of that province. An account of his subsequent work is given in the book of *Nehemiah,* the latest of the historical books of the Old Testament. He rebuilt the walls of Jerusalem, took

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an active part in securing the adoption of the Law by the returned exiles, held a great feast at the dedication of the walls of the city and contended for the strict observance of legal rites. He emphasized churchly rather than national issues.

NEIGHBORHOOD, *na'ber hood,* **CENTERS.** See COMMUNITY INTERESTS.

NELSON, a city in the southeastern part of British Columbia, the capital and largest city of the Kootenay district. It is located on the west arm of Kootenay Lake, which is navigated by steamers running to Kasle, Kootenay Landing and other points. The city is also served by the Spokane line of the Great Northern Railway and by several branches of the Canadian Pacific Railway, one of which connects with the Kettle Valley Railway at Midway. Midway is 127 miles west of Nelson, Vancouver is 513 miles west and Spokane is 199 miles southeast. From Nelson to Revelstoke, on the main line of the Canadian Pacific, is a distance of 184 miles by rail and steamer. Kootenay Landing, the western terminus of the Crow's Nest branch of the Canadian Pacific, is sixty miles southeast by steamer. Population in 1911, 4,476; in 1916, estimated, with suburbs, 7,500.

Nelson is the commercial center of the Kootenay country, a section noted for minerals, lumber and fruits. The mines of this district produce gold, silver, copper, lead, zinc and other minerals to a value of $20,000,000 a year. The chief industrial establishments of the city produce iron, cigars, jam, soda water, marble, mattresses, boxes and boats. Saw and shingle mills are conspicuous both in the city and in the neighborhood. Nelson is a division point on the Canadian Pacific, and has railway repair shops. The municipality owns the hydroelectric light and power plant, gas and water systems, and the street railway. Not far away are many places of scenic interest, including glaciers, hot springs and cataracts, and there is also an abundance of game birds and large game.

NELSON, HORATIO (1758-1805), the most famous of British admirals, who, with his right arm and his right eye gone, won the greatest victory in English naval records. He was born in Burnham-Thorpe, Norfolk, England, September 29, 1758; his father was rector in his native town, and his mother was a descendant of the famous Walpole family.

Though the boy was sickly and possessed little endurance, he had an ambition to go to sea. So when his maternal uncle, Capt. Maurice Suckling, set sail for the Falkland Islands, Horatio, who was only twelve years old and had but little education, begged to be allowed to accompany him. His uncle, though not approving of the plan, yielded; and it was to his guidance that Nelson owed the excellence of his early training.

LORD NELSON
His signal at Trafalgar, "England expects every man to do his duty," has inspired British seamen for over a hundred years.

When fifteen years old, he was permitted to go as coxswain on an expedition to the North Pole. A trip a little later to the West Indies resulted in a fever, which left his health seriously undermined. At nineteen, the commission of second lieutenant was given to him; in 1778 he was made commander, and the following year post captain. A cruise to Central America brought on a second protracted illness and a return to England.

In 1783 Nelson was given command of the *Boreas,* stationed in the West Indies, and he served there until 1787. During this period he disregarded the orders of his commander, Sir Richard Hughes, who forbade him to enforce the Navigation Laws against America. Though this situation caused Nelson considerable trouble and anxiety, he was later upheld by the British government. While in the West Indies he married the widow of Dr. Josiah Nisbet, and his bride was given away by Prince William, England's future king. Shortly afterwards Nelson was recalled from active service and remained on the retired list until the outbreak of the war between England and France, in 1793. Then, in command of the *Agamemnon,* he rejoined the Mediterranean fleet. He was promptly sent to blockade the principal strongholds of Corsica, and in the victories which followed took an important though necessarily subordinate part. At Calvi, one of the blockaded ports, he received a wound which deprived him of his right eye.

Nelson next distinguished himself at the Battle of Cape Saint Vincent (1797) and was rewarded by knighthood in the Order of the Bath; just before this battle he had reached by regular promotion the rank of rear-admiral. He

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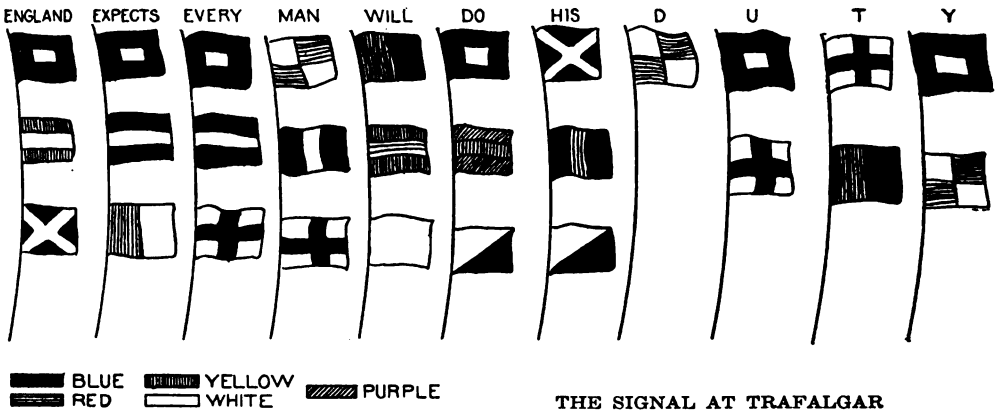

THE SIGNAL AT TRAFALGAR

suffered but one real defeat, that of the Battle of Santa Cruz; and it was in this battle the wound was received which cost him his right arm.

A period of brilliant successes followed Santa Cruz, which includes the three great victories of Aboukir, Copenhagen and Trafalgar. When the French began to concentrate their forces against Great Britain, Nelson was sent to watch the French ships at Toulon. Because of a mishap they escaped, and Nelson started on a long and tedious pursuit, finally locating the fleet in the Bay of Aboukir, where he completely routed and destroyed it. This victory brought him plaudits from all over the world, also the title of Baron of the Nile and a pension of £2,000

FLAGSHIP "VICTORY"

($10,000). It was in this period of his life that he met Sir William and Lady Hamilton, and brought upon himself the one blemish on his career, through his admiration for the latter.

In 1801 Nelson hoisted the flag of a rear-admiral, and under command of Admiral Parker sailed for Copenhagen. The British claimed the right of belligerents to search neutral ships for contraband of war, which Denmark, supported by Russia, refused. After a council of war Nelson was appointed to make the attack on the Danish fleet. When Parker saw what appeared to threaten an unfavorable outcome, he gave the signal of recall. Nelson, believing in his ability to win, disregarded the order, and turned what might have been a crushing defeat into a great victory.

In May, 1803, as commander-in-chief of the fleet, Nelson once more went in search of the French; his flagship was the *Victory*. As the French fleet slipped out of the harbor of Toulon, he began his famous pursuit, which ended in the battle of Trafalgar, on October 21, 1805. In this engagement the combined French and Spanish fleets were destroyed by twenty-seven English vessels. It was the greatest conflict of the age, but Nelson received his death wound, living only long enough to know that he had won the most brilliant victory of his life. The guns ceased firing as he drew his last breath. It was during this battle that the memorable signal to the fleet was displayed, "England expects every man to do his duty."

Nelson's motto was "Strike quick—and home," and his masterful comprehension and prompt action saved many a critical situation. His frail body was animated by an indomitable spirit.

Consult Mahan's *Life of Nelson*.

NELSON, Wolfred (1792-1863), a Canadian physician and political leader, who took a conspicuous part in the Lower Canada Rebellion of 1837. Dr. Nelson was born in Montreal, where his father, an English army officer, was stationed. The boy received a good education, studied medicine, and in 1811 began to practice. During the War of 1812 Dr. Nelson served as a surgeon with the British army. He then practiced without interruption until 1827, when he

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was elected as a Reform member of the Lower Canada assembly. He labored earnestly to secure some readjustment of political rights for his province, and was soon recognized as one of the foremost Radicals in Canada. In 1837 Papineau persuaded him to take a hand in the revolt. Nelson was in command at Saint Denis, Lower Canada, when the rebels won a victory over the government's forces. Later he was captured and, by the Earl of Durham's order, was banished to Bermuda. He was released after a year, and until 1842 made his home at Plattsburg, N. Y.

The proclamation of amnesty in 1842 opened Canada to Dr. Nelson. He at once returned to Montreal, where he won new honors and showed his ability and his high character to better advantage. In 1854 and 1855 he sat in the Lower Canada assembly. Later he was for several years inspector of prisons, was twice elected mayor of Montreal, and as head of the Lower Canada College of Physicians and Surgeons held a high place in his profession. The indiscretions of his youth were forgotten in the solid achievements of his mature years.

NELSON RIVER, the largest river in Manitoba. It forms the lower course of the great Saskatchewan River, which rises on the eastern slopes of the Rockies, flows across the plains of Alberta and Saskatchewan, and finally empties into Lake Winnipeg. The surplus waters of this system, as well as of the Red and Winnipeg rivers, are carried from Lake Winnipeg to Hudson Bay by the Nelson River, which issues from the northern end of the lake. It is a deep, broad and swift stream, carrying an enormous volume of water and having an average fall of nearly two feet per mile, throughout its length.

The Nelson is navigable for small steamers for about sixty miles below its outlet from Lake Winnipeg. The lower course for seventy miles from the mouth is also navigable for small steamers or gasoline launches, but the middle course is broken by numerous rapids and heavy falls, and is navigable only for canoes. At the mouth of the Nelson is Port Nelson, the terminus of the Hudson Bay Railway, and near it is York Factory, an old trading post. The Nelson is 430 miles long from Lake Winnipeg to its mouth, and is 1,700 miles long from its mouth to the headwaters of the Saskatchewan. The entire drainage basin of this river system covers 370,800 square miles, an area one and one-half times that of the province of Manitoba. J.B.T.

NELUM'BO, a genus of plants which grow in fresh water and resemble the water lilies, the best-known representatives of which are the lotuses, particularly those of China and Egypt. The fleshy roots and the seeds and stalks of the lotus are used as food by the Chinese, the roots furnishing Chinese arrowroot. In China this is pickled with salt and vinegar and used to flavor rice, or is powdered and made into soup. In India, where the lotus is held sacred, the fiber of the dried stalk is used as a wick for the temple lamps. *Yellow nelumbo* (also called *lotus, sacred bean* and *water chinquapin*) is an American species found occasionally in the Middle United States and in the eastern part of the country. The leaves are from eighteen to twenty inches across and are borne on tall stems. The yellow flowers are from one to five inches in diameter. See LOTUS.

NELUMBO

NEMEAN, *ne me'an,* or *ne'me an,* **GAMES,** one of the four Greek national festivals, held at the shrine of Jupiter or Zeus, in the valley of Nemea in Argolis. The Nemean games were celebrated every other year in midsummer, and the competitive exercises were athletic contests, horse racing and playing the cithara, the ancient Greek harp. Each winner was given a palm branch and a crown of parsley. The games were said in legend to have been instituted by Hercules in honor of his father, Jupiter, but later they became a feature of the worship of Hercules himself. It was in the Nemean forest that the hero performed the first of his twelve labors—the slaughter of the lion (see HERCULES). The first series of games recorded in the historical period was celebrated in 573 B.C. See OLYMPIAN GAMES.

NEMESIS, *nem'e sis,* in Greek mythology, the goddess of vengeance, who represented the just anger of the gods. She was especially inflexible in her attitude toward those who were proud and insolent and did not pay to the gods proper reverence. To-day the word means retribution or retributive justice, an exact distribution to every man according to his deserts.

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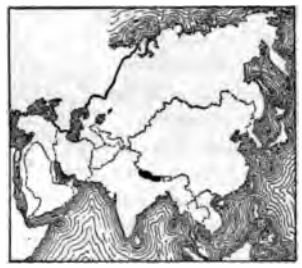
NEPAL, or **NEPAUL,** *ne pawl',* an independent kingdom in Northern India on the southern slope of the Himalaya Mountains, lying south of Tibet and north of British India. Its area, about 54,000 square miles, exceeds that of England. The northern part of the country is a lofty highland which contains some of the highest mountains in the world, among them mounts Everest and Dhawalaghiri, but the southern part is a broad, fertile plain watered by the Karnali, Gandak and Kosi rivers, where thousands of small, intensively-cultivated farms produce rice, tea, sugar cane, tobacco and cotton.



LOCATION MAP
Nepal is the long, nearly east to west strip shown in solid black between India and China.

Among the mountain ranges of the north, where there is small opportunity for farming, every foot of land in the narrow valleys is used; the hillsides are terraced, and the mountain streams utilized for irrigating, and there are grown in this region the hardier crops, such as barley, corn, wheat, buckwheat and pulse. Though pastures are scarce, the few sheep raised are noted for their fine wool. There are mines, too, containing rich deposits of iron, lignite, copper, lead and zinc; these, however, are but little worked. The great forests on the mountain sides are another almost untouched source of wealth. In the cities of the lowland, chief among which are Khatmandu, Patan and Bhatgaon, coarse cotton cloth, bells and other metal ware, pottery and a very strong, heavy paper are manufactured.

The people of Nepal are of many tribes and races. Before the fourteenth century the land was inhabited mostly by scattered, half-savage tribes of Chinese origin, but in the fourteenth century the Hindus began coming in from the south. They settled in the fertile lowlands, intermarried with the natives, founded cities, built temples to the Hindu gods, developed the fields and organized many petty kingdoms. They came to be called *Newars* and their country *Nepal.* The Newars, who constitute the largest division of the population, are a rather small, robust people, with the flat face, yellow complexion and oblique eyes of their relations, the Chinese.

The ruling class in Nepal consists of a Hindu race known as the Gurkhas, who invaded the country in the twelfth century and permanently settled there late in the eighteenth century. They are a brave, warlike people, who, since their war with the British in 1814, have remained on friendly terms with England. The latter country has established a British residency at Khatmandu, the Nepalese capital. The Gurkhas form twenty battalions of the native army of the Indian Empire, and in the War of the Nations they rendered valued service to the British government. The total population of the country is estimated to be about 4,500,000.

NEPHRITE, *nef'rite,* a term sometimes used for jade (which see).

NEPHRITIS, *ne fri'tis,* the general name for any inflammation of the kidneys. The disorder may be sudden, transitory and easily relieved, or slow, gradual and incurable. A common form of nephritis, known as *Bright's disease,* is discussed under that title in these volumes. A serious complication of nephritis is poisoning from reabsorption of the waste material which the kidneys have failed to carry off; this malady, known as *uraemia,* or *uraemic poisoning,* has as its characteristic symptoms—drowsiness, stupor and convulsions. Nephritis may be either the result or the cause of heart disease, and any of its forms should have the prompt attention of a physician. See KIDNEYS.

NEP'IGON. See NIPIGON.

NE'POS, CORNELIUS, a Roman historian who lived in the first century B.C. Nothing is known of his life except that he was probably born at Verona and was a friend of Cicero and Catullus. Only one of his works survives, and some scholars question the authenticity of it. It is a series of biographies, twenty-five in number, of illustrious men of various nations. The facts of these lives as given are not always trustworthy, but the language is so clear and concise that the work has been much used as a textbook in Latin, and many excellent editions of it have been issued.

NEPOTISM, *nep'o tis'm,* the name given to a practice whereby rulers grant official favors to members of their families. In Latin it means, literally, *nephew-ism.* The word was coined to describe the practice of certain Popes, especially those who reigned during the two centuries before the election of Alexander VII in 1655. During this period nearly every Pope appointed his nephews and other relatives to positions of importance, no matter what the

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cost to the treasury, which could always be filled by increasing the taxes levied on the common people. Pope Alexander, the first great enemy of nepotism, said that the Barberini family, relatives of Urban VIII (1623-1644), had alone burdened the Papacy with interest charges to the amount of 483,000 scudi a year, nearly one-fourth of its income. The results of nepotism kept the Papal states near to bankruptcy till the nineteenth century. To-day nepotism refers to the appointment of his relatives to office by one in official position.

NEP'TUNE, the Roman name for the god whom the Greeks called Poseidon, the brother of Jupiter, and second only to him in authority. When the universe was divided Neptune received the seas, the rivers and the fountains—in fact the waters everywhere. Two stories of Neptune were great favorites with the Greeks. The first describes the contest between him and Minerva, in which the one who created the more useful object would be privileged to name the new and growing city of Athens. Neptune created the horse, and pointed out proudly the many ways in which it would be useful to man, but Minerva made the olive tree and convinced the judges that it was the more valuable of the two. From her Greek name, Athene, the city was called Athens.

Hail, Neptune, greatest of the gods!
Thou ruler of the salt sea floods;
Thou with the deep and dark-green hair,
That dost the golden trident bear;
Thou that, with either arm outspread,
Embosomest the earth we tread:
Thine are the beasts with fin and scales,
That round thy chariot as it sails,
Plunging and tumbling, fast and free,
All reckless follow o'er the sea. —ARION.

At another time Neptune, dissatisfied with his kingdom, attempted to gain control of Jupiter's, and as punishment was condemned to build for Laomedon, king of Troy, the walls of his city. Apollo aided Neptune by playing on his lyre, so that the stones sprang into place, and the task was quickly completed. The treacherous king, however, refused to give to the two gods the promised payment, and in consequence both Neptune and Apollo fought against the city in the Trojan War. Neptune was especially worshiped by sailors and those who had to do with horses, and games were celebrated in his honor, the most important being the Isthmian Games, which were held every four years at Corinth. In art Neptune is shown as a majestic man with broad chest and well-developed muscles; in his hand he carries a three-pronged spear, or trident, his special symbol. He is usually drawn through the water by dolphins, and Triton, his son by Amphitrite, accompanies him. See MYTHOLOGY.

NEPTUNE, named for Neptune, the god of the sea in Grecian mythology, is a planet that is never visible to the naked eye. About it little is definitely known, except that it is the outermost planet of the solar system, so far as man is able to determine. Its discovery, considered one of the greatest triumphs of astronomy, was brought about by the study of the planet Uranus, which showed eccentricities which led astronomers to believe it was being acted upon by some invisible body. Two astronomers, Leverrier and Adams, were able by deduction and mathematical calculation to determine what body could produce the variations noticed and where that body was to be found. The result was the discovery of Neptune, just where these two astronomers had, independently of each other, stated it would be located. Soon afterwards it was found that the planet has one moon, revolving around it from east to west.

Neptune is at an average distance of 2,800,000,000 miles from the sun. Its diameter is about 30,000 miles, some authorities stating it as 33,000 miles, or nearly four times as great as that of the earth. The planet completes its journey round the sun in 164 years, traveling in its orbit at the rate of about three and one-half miles per second. Through a telescope, Neptune appears to have a disk of a greenish color. Its mass is about eighteen times that of the earth, and its *albedo,* or reflecting power, is a little less than that of Venus. As to its rotation on its axis, nothing is definitely known. The earth receives 900 times as much light and heat from the sun as are conveyed to far distant Neptune.

For comparative size of Neptune and the other planets and distances from the sun, see PLANET; see, also, ASTRONOMY.

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NERBUDDA, or **NARBADA,** *nur bud'ah,* a river in India which the Hindus hold in special reverence, regarding it in sacredness as second only to the River Ganges. Along its entire course of 800 miles are places of pilgrimage, and it is considered an act of great devotion to walk from the mouth to the source of the stream and back again on the opposite bank. This journey takes from one to two years to complete. The Nerbudda rises in the Maikal Range, in the northern section of the Central Provinces, and empties into the Gulf of Cambay through an estuary which begins 200 miles north of Bombay, at Broach. Its general direction is westerly, and in the upper half of its course it makes its way over many falls and rapids. On the lower stream large vessels can sail eighty-two miles from the mouth, in the rainy season, and when the tides are favorable seagoing ships can ascend the estuary as far as Broach, thirty miles from the sea.

NEREIDS, *ne're idz,* according to Greek mythology, were the fifty daughters of Nereus and Doris. The Nereids were beautiful and friendly sea nymphs, attendants of Neptune and Poseidon, the former of whom had a Nereid wife, Amphitrite. They were sometimes represented as half human, half fish, but at other times they were pictured as wholly human, riding on sea horses or other monsters of the ocean. Thetis, mother of Achilles, was one of the few well-known Nereids. See NEREUS.

NEREUS, *ne're us,* in Greek mythology, a minor deity of the sea. He was famous only as father of the fifty Nereids, and was often called *the old man of the sea.* He alone knew the way to the Garden of the Hesperides, and one of Hercules' twelve tasks was to seize the golden apples of the Hesperides. In Hercules' hands, Nereus turned from fire to lion, from lion to water, from water to smoke, until, exhausted, he resumed his own shape and directed the victorious Hercules on his journey. See NEREIDS; HERCULES.

NE'RO, LUCIUS DOMITIUS (37-68), for fourteen years an emperor of Rome, and generally regarded as one of the most infamous of men. His father was Cnaeus Domitius Ahenobarbus, his mother the daughter of Germanicus Agrippina, who in A.D. 49 was married to the Emperor Claudius. She at once began to scheme for her son's succession to the throne, in the place of Claudius' son Britannicus, and succeeded in inducing the emperor to adopt him. When Claudius died in A.D. 54 the Praetorian Guard and the Senate united in acclaiming Nero emperor, and he was received with great enthusiasm by the populace. For a time he did nothing to endanger his popularity, for Seneca, his tutor, practically directed the government and skilfully held Nero's passions in check.

NERO
From a bust in the Uffizi Gallery, Florence, Italy.

A Reign of Murder and License. A quarrel with his mother, who had always had great influence over him, led to the murder of Britannicus, whose cause she had threatened to espouse, and Agrippina's death followed in '59; she was killed by her son's orders. From that time on he behaved like an animal that has tasted blood. The slightest suspicion, however ungrounded, against anyone was the sure forerunner of speedy death. There were, of course, conspiracies against the emperor, and among those who were put to death after the discovery of one of these was Seneca, against whom no proof was ever advanced. The emperor plunged, also, into every kind of vice and profligacy, and yet he demanded the adulation of his people for his achievements as poet, athlete, musician and philosopher. He journeyed through Greece, taking part in all the public games and contests, and granted privileges to the province because of the way in which his vanity was flattered.

Rome Burned and Rebuilt. In A.D. 61 occurred the insurrection in Britain under the famous Boadicea, and in 64 the great fire took place in Rome. For six days the conflagration raged, and two-thirds of the city was destroyed; because Nero showed himself unmoved by the disaster, playing upon his fiddle and reciting verses about the burning of Troy while he gazed at the blazing city, he was very generally accused of having been the incendiary. There is no positive evidence that this was true, but he feared the wrath of the people and laid the blame upon the Christians, who were persecuted in all parts of the empire. He rebuilt the city on a far more magnificent scale than before, constructing for himself a wonderful home called the Golden House, in which his orgies took place.

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In the year 68 the legions in Spain revolted, declaring their leader, Galba, emperor, and the insurrection spread to the Praetorian Guard. Nero fled, but was overtaken, and committed suicide. The detestation of him had been so great that his name was erased from records and monuments, his palace was torn down and his statues were broken; but despite all this, and partly because of it, no one of the emperors was more generally remembered.

Consult Henderson's *Life and Principate of the Emperor Nero;* Abbott's *History of Nero.*

NER'VA, MARCUS COCCEIUS (39-98), the thirteenth Roman emperor, the successor of Domitian. He served as consul in the reign of Titus and Vespasian, and in 96, on the death of Domitian, was elected emperor by the Senate. His predecessor had left many abuses which needed reforming, and Nerva proved both wise and beneficent, lessening taxes, placing justice within the reach of all, and recalling exiles. Fearing the strength of the Praetorian Guard, he associated with him in the rule Trajan, commander of the legions in Germany, who succeeded him. Nerva was deified by the Senate after his death.

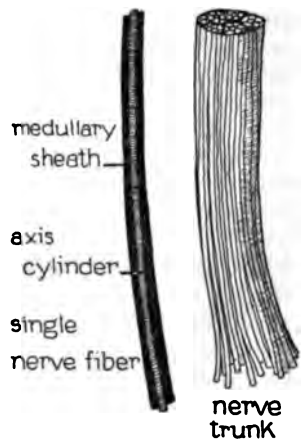
NERVES, *nurvz,* the organs of the nervous system which carry impulses from the brain and other nerve centers to all parts of the body, and from various parts of the body to the nerve centers. Nerves conveying impulses to the nerve centers are called *sensory* or *afferent* nerves, and those conveying impulses from the centers to various parts of the body, *motor* or *efferent* nerves. See NERVOUS SYSTEM, subhead *Nerves.*

NERVOUS, *ner'vus,* **SYSTEM.** If your hand touches a hot object you instantly withdraw it. If the point of the finest needle pricks through the skin you sense the pain and locate the injury. If a friend calls to you from across the street you respond. When you run your heart beats faster, and you breathe more quickly and deeply. Under all conditions your body adapts itself to its surroundings, and the organism which enables it to do this is the nervous system. In the lower animals the nervous system is very simple and incomplete, but as we pass from these to the higher forms of animal life we find the nervous system becoming more and more complex, until in man it reaches its highest development.

The nervous system consists of the brain and the nerves. It is often likened to a great telephone system. The brain corresponds to the central exchange, the nerves to the connecting wires and the networks of nerves or ganglions to the local exchanges. The nerves carry impressions (messages) from all parts of the body to the brain, and the brain sends impulses (commands) to all parts of the body; hence this comparison gives a very good idea of how our nervous system acts, with this exception—the telephone system must be set in action by some outside force, while the brain has the power to impel the nerves to action because it is the seat of the mind.

The nervous system is generally divided into the cerebrospinal and the sympathetic systems. The description of these will be better understood if we first learn something about the structure of nerve tissue.

Structure of Nerve Tissue. Examination of nerve tissue under a powerful microscope shows it to consist of cells having a peculiar form. They consist of a central portion or mass and long, threadlike branches whose ends resemble that of a string that has been frayed out. These cells, to which the name *neurone* is given, compose the nerve matter of the system, so that "the nervous system equals the sum of its neurones." Some of the branches of the neurones extend to remote parts of the body, but most of them are short. The branches of different cells meet and connect cell with cell and nerve with nerve. There are millions of these cells in the brain, and they extend through it in all directions, uniting each center with its respective nerves and one center with another.



A NERVE
Very highly magnified.

Nerves. Dissection of any animal reveals numerous white cords extending through the muscles. These are nerves, or nerve trunks. Each nerve consists of a central axis composed of neurones, and enclosed in a sheath of white fibrous tissue. A nerve trunk consists of a bundle of nerves and may be compared in its structure to a bundle of wires, each wire insulated by being wound with thread. However, the white fibers in the nerve run lengthwise instead of being wound round the axis, as they

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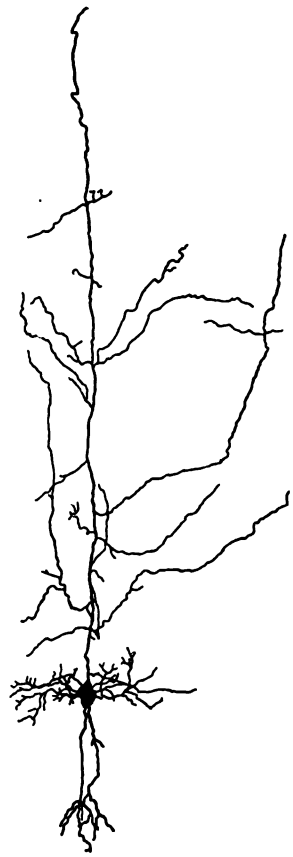
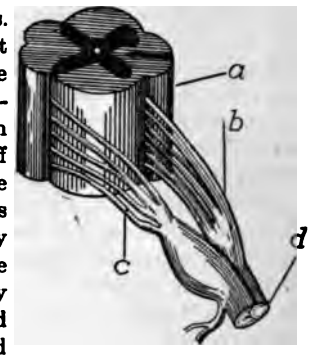
are in case of the wire. The nerves divide and subdivide as they extend from the main nerve trunk until they form a complete network under the skin, so closely woven that you cannot prick it anywhere without injuring one or more of the nerves. The frayed-out ends of the neurones take different forms for different purposes. Those connected with the sense of touch, for instance, take one form, and those connected with the sense of sight another, so that each set of nerves is especially adapted to its peculiar function. Nerves, like the brain, consist of gray and white matter, the gray matter forming the axis and the white the sheath. There are two classes of neurones, those carrying impulses to the brain and those carrying impulses from the brain, and neither set can perform the function of the other. The nerves formed from neurones of the first class are called *sensory* nerves and those formed from the second class, *motor* nerves.



A NEURONE
From the optic nerve; very greatly magnified.

Cerebrospinal System. The cerebrospinal system comprises the brain, the spinal cord and the nerves branching off from them. It presides over voluntary motion, is the seat of the sense of touch and other senses connected with the muscles, and through one pair of the cranial nerves connects with the sympathetic system, which, in a measure, it controls.

Spinal Cord. The spinal cord is the largest nerve trunk in the body. It extends from the medulla oblongata through the cavity in the spinal column to the lumbar vertebrae. It is divided by folds into right and left halves, and each half has three columns slightly marked by folds. At its lower extremity it divides into a number of nerve trunks, some of which continue downward in the spinal column to the sacrum; others extend to the lower limbs. In the lower part of the neck there are also enlargements from which nerves branch off to the arms. The spinal cord is composed of gray and white nerve tissue. The gray matter is enclosed in the white, and a cross section of it somewhat resembles the letter *H*. In the center of the cord there is a canal which, at its upper end, connects with the ventricles of the brain.



SPINAL CORD
A section of the spinal cord (*a*), showing sensory nerve (*b*), motor nerve (*c*), and nerve trunk (*d*).

Spinal Nerves. Thirty-one pairs of nerves branch off from the spinal cord and extend to all parts of the surface of the body below the head and neck. Each nerve trunk contains sensory and motor nerves, the sensory branching from the posterior and the motor from the anterior side of the cord. Soon after leaving the openings between the vertebrae these nerves unite and form a small network or ganglion, as shown in the illustration.

Physiology of the Cerebrospinal System. The nerves of the cerebrospinal system work in pairs, the sensory nerves conveying impulses to the brain and the motor nerves conveying impulses from the brain. You say, "John, please close the door." Your words are carried to the auditory centers of the brain through the nerves of hearing, and the brain sends to the necessary muscles the impulse to perform the act. You hand me a book and ask me to read to you. The forms of the words on the printed page are conveyed to the brain through the nerves of sight, and the brain sends impulses through certain motor nerves that cause me to utter the words aloud. You can recall hundreds of illustrations of this sort of nerve action.

Sometimes, as in case of injury or fright, the motor impulse is sent over the nerves before the sensory impulse has reached the brain, the communication of one set of nerves with the

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other being made through a minor nerve center. This is explained under REFLEX ACTION (which see).

Cranial Nerves. Twelve pairs of nerves branch off directly from the brain and reach the muscles and other organs through openings in the skull. The following pairs are of interest to the general reader: The first pair are the nerves of smell *(olfactory)*; the second, the nerves of sight *(optic)*, and the third, the nerves which control the movements of the eye and the contracting of the iris to accommodate the pupil to the intensity of light. These are the *motor nerves of the eye.* One branch of these nerves controls the movements of the upper eyelid. The eighth pair are the nerves of hearing *(auditory)*, and the ninth, the nerves of taste *(glosso-pharyngeal)*. The tenth pair are often called the *pneumogastric nerves.* They are distributed to the pharynx, windpipe, lungs, heart, stomach and other vital organs, thus forming the connection between the sympathetic and the cerebrospinal systems. It is through the action of these nerves that mental states affect the vital organs. Fear, for instance, lessens the number of heart beats, and melancholy influences digestion. The nerves of the twelfth pair *(hypoglossal)* are distributed to the tongue and control the movements of that organ.

Sympathetic System. The nerves of the sympathetic system extend to the heart, lungs, stomach, intestines and other vital organs, whose action they control. These nerves branch off from the spinal nerves not far from the spinal column and enter a row of ganglia on each side of it. Each ganglion is connected with the one above and the one below it. After leaving the ganglia the nerves form many large and intricate networks called *plexuses.* The largest, the *solar plexus,* lies just back of the stomach. A blow on the stomach may paralyze the nerves of this plexus and cause death. The nerves of this system so bind together the vital organs that any injury or disease affecting one organ affects all. Because these organs seem to sympathize with each other the term sympathetic was applied to this system, but it has little significance. These nerves act more slowly than those of the spinal system. Injury to a spinal nerve is instantly known, but pains caused by indigestion may not be felt until several hours after the meal is eaten.

Hygiene. The brain and nerves are the most delicate body structures. They are the most easily injured and the most difficult to restore to a state of health. The first requisite to the health of the nervous system is an ample supply of pure blood. One-fifth of the blood goes to the brain and proportionate quantities are required for the nourishment of the nerves, consequently one who desires to maintain his nerves in a normal condition should eat plain, nutritious food and take plenty of exercise in the open air.

Overwork, either physical or mental, subjects the nerves to an unnatural strain and should be avoided (see FATIGUE). Sleep is one of the best restorers of nervous energy. Stimulants, narcotics and drugs are injurious and should not be used except under the direction of a physician. W.F.R.

Related Subjects. The following articles are closely related to this subject, and reading them will add interest to it:

Blood	Health Habits
Brain	Narcotic
Breath and Breathing	Reflex Action
Ear	Senses, Special
Education, subtitle	Sleep
Hygiene of Education	Taste
Eye	

NEST. See BIRD, subtitle *Nests of the Birds.*

NES'TOR, a Greek hero, the son of Neleus and Chloris, king and queen of Pylos in Messenia. While he was away on a visit to Gerenia, Hercules killed his father and brother, because Neleus refused to purify him after the murder of Iphitus (see HERCULES). Nestor escaped only because he was away. He became a great warrior and took part in the battle between the Centaurs and the Lapithae. According to some writers he was one of the huntsmen who helped slay the great Calydonian boar, and a member of the Argonautic expedition (see ARGONAUTS). During the Trojan War, although he was an old man and could not fight, he was one of the wisest of the Greek council; this tradition of his wisdom has been preserved in the figurative use of the name *Nestor* as a synonym for one who is very farseeing and prudent.

NET, the name of a fabric with an open weave, made of the various threads used in textiles, from the finest silk to the coarsest hemp. The spaces between the threads are called the meshes, and the threads are knotted at the intersections, to keep the meshes a uniform size. Net fabrics are used for numerous purposes. They are made into nets for catching fish, animals and insects, they serve for hammocks, screens and various domestic purposes, and for the daintiest of women's apparel. Wire netting is used to fence poultry yards.

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The principal kinds employed for fishing are the *seine,* the *drift* and *trawl,* the *kettle* or *weir,* and the *trammel* nets. The *seine* is very long in proportion to its width, and has a line of corks along one of its long ends and a line of leaden weights on the other, so that it becomes a perpendicular sheet when thrown into the water. It is used near the shore. The *drift* net has the same proportions of length and breadth, but is not loaded with lead, and floats in the water. The *trawl* is a huge pocket, and is dragged along the bottom by the motion of the boat. *Kettle* or *weir* nets, structures fixed on stakes, are placed along the coast between high and low water. *Trammel* or *set* nets are also fixed between stakes, but act like drift nets. Nets were originally woven by hand, but are now made on looms. According to Norse mythology, fishing nets were invented by Loki. See ANGLING.

NETHERLANDS, THE, or **HOLLAND,** one of the most important small countries in the world. Though its area of 12,648 square miles is smaller than that of any European nation except Belgium or Montenegro, and its population of 6,212,700 in 1913 is only a fraction of that in many other countries, it has a foreign trade exceeded in all the world by only Great Britain, Germany and the United States, and rules an empire of nearly 40,000,000 people, the third largest on earth. The country is about the size of Maryland, and not half that of New Brunswick.

People. The inhabitants of this little nation call themselves *Nederlanders,* for the word *Dutch,* by which we know them, is merely a corruption of *Deutsch,* meaning German. Though they have had their distinctive characteristics for centuries, most of them are rather like Germans, but the people of Limburg, the province which juts out to the south near the Belgian city of Liége, are akin to their neighbors of Belgium. Dutch folk are known the world over for the quaintness of their costumes, the wooden shoes of the farmers, their baggy trousers or breeches, and the neat little caps worn by the women of some provinces. Dutch housewives, too, are noted for their fondness for scrubbing. The whole nation is thrifty, and, except the Limburgers, inclined to seriousness. There are half a million bicycles in the country, but fewer motorcycles and automobiles than in any large city of America. Football, gymnastics and skating—and of course moving pictures—are popular, and there are municipally owned theaters. Though close bargainers and very cautious in business, the Netherlanders are renowned for their good faith, honesty, modesty and frankness.

Before 1815 Holland was purely a Protestant state, but the provinces of Limburg and Brabant, and part of Guelderland, all added to the kingdom in that year, are solidly Roman Catholic. The Protestants still constitute nearly two-thirds of the people, and over half of them are members of the Dutch Reformed Church. There are over 100,000 Jews, who have been permitted freedom of worship only since 1847.

Education. Going to school in Holland is a serious business. Even in the universities there are few of the games and sports which brighten school days in America. About three-fifths of the boys and girls go to the public schools; the rest, most of whom are in Roman Catholic provinces, attend private schools. These, too, are under the supervision of the government; all the teachers must pass government examinations, and twice a year, at unexpected times, inspectors appear to examine the pupils in all their studies and discover if the teachers are doing good work. Children between the ages of seven and fourteen are obliged by law to attend school. After finishing the primary grades they have their choice of several courses. There are industrial schools, of which all the carpenters and blacksmiths are graduates. Then there are the *professional* schools, the *burgher* schools and the *gymnasia,* all somewhat like American high schools. Of the five universities,

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four—Leyden, Utrecht, Groningen and Amsterdam—were established in the Middle Ages. There is also a state agricultural school, which teaches forestry as well as farming.

Language and Culture. Most of the Netherlanders speak the tongue we know as Dutch, which is a near relative of *Plattdeutsch,* or Low German. Flemish, the language of Limburg and Brabant, is not very different. Each province in the whole land is said to have a distinct accent or dialect. Many of the Dutch words bear a close resemblance to those of our own tongue, and a traveler in the country who knows both English and German has little difficulty in understanding the signs on shops or wagons. One striking peculiarity of Dutch spelling appears in the word *ijs,* which is the exact equivalent in meaning and sound of the German *eis* and the English *ice.*

Dutch literature is little known outside its native land, and educated Netherlanders read many books in English, French and German. Erasmus the scholar, Spinoza the philosopher and Grotius, or de Groot, the father of international law, were among the world's greatest men, but like all men of their time, they wrote in Latin. Among the leading writers in the Dutch language are Joost van den Vondel (1587-1679), a dramatist; Jakob Cats (1577-1660), and Willem Bilderdijk (1756-1831), poets; Hendrik Tollem (1780-1856), who wrote lyrical romances; Jakob van Lennep (1802-1868), the Walter Scott of his country; Nikolaas Beets (1814-1903), author of descriptive sketches of his people; Louis Couperus (born 1863), a novelist; and Petrus J. Blok (born 1855), the first Dutchman to write a standard history of his own land.

National fame in music and in art have not accompanied each other in Holland, as they do in most countries. Though to-day Amsterdam has, under Mengelberg, one of the best known philharmonic orchestras in Europe, the Dutch are not a musical people, and have produced no composers. But the Netherlands has given the world some of its greatest painters—Rembrandt, Frans Hals, Jan Steen, van der Meer or Vermeer of Delft and many others (for more about the art of Holland, see PAINTING). In another field of art the nation to-day possesses one who is considered by many to be without an equal—Louis Raemakers, the cartoonist whose stirring pictorial interpretations of events in the War of the Nations created new standards for journalistic drawing.

LOCATION MAP

COMPARATIVE AREAS

The Netherlands is one of the smallest and one of the best governed countries in the world. Its area is only 12,648 square miles, and is therefore only about half that of the small American state of West Virginia. The province of Quebec, in the Dominion of Canada, is more than fifty times as large.

The Country. No name in all geography is better suited to its purpose than Netherlands, for it exactly describes the country which bears it. Holland, too, is appropriate, if, as many think, it originally meant Hollow-land. Part of the little kingdom is below the sea, which is kept back by the famous dikes (dijken), and the mean level of the whole country is only about thirty feet higher. But for Limburg, in which the land rises in one place to a height of over 1,000 feet, the mean level would be even lower than it is.

Napoleon once called the Netherlands the alluvium of French rivers. Three great streams, the Rhine, the Meuse (here called Maas) and the Scheldt, have built up a large part of the kingdom. Other parts have been reclaimed

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from the ocean, especially on the shores of the Zuider Zee, the great indentation in the north coast formed on the site of an ancient lake by the sea floods of the twelfth and thirteenth centuries. As is always the case in delta lands,

COSTUMES IN THE NETHERLANDS
For over three hundred years the styles of dress, for both men and women, have remained unchanged.

there are many islands along the coast; the province of Zeeland (Sea-land), at the southwest corner, is almost entirely made up of them. Sand dunes protect most of the shores, and between them are built the dikes, huge barriers of earth and stone. There are lakes, marshes and bogs everywhere in the kingdom.

Farming. Dutch agriculture is known to outsiders principally for cheeses, and Dutch horticulture for hyacinths and tulips. Three-fourths of Holland is farmed, and almost exactly half this amount is in meadow and pasture. In the summer many of the cows are kept in *polders,* drained enclosures sometimes forty feet below the sea, which are pumped constantly by windmills. On the edges of the polders are set posts, so that the storks may be attracted to build nests, for these strange birds keep away the frogs and toads. In winter each farmer's cattle are removed to a scrupulously clean room which is part of the farmhouse itself. There are two types of Dutch cheese; that known best in America comes from Edam, in hard, round balls colored red on the outside. The quantity of cheese made each year is worth about $10,000,000, and, of course, most of it is exported.

If one who has crossed the fields of Illinois, where at times nothing but corn is visible in any direction, or the prairies of Saskatchewan, where wheat is the only thing to be seen, can imagine the place of the grain taken by gorgeous masses of red, blue, yellow, white and purple hyacinths, he will gain some idea of the spectacle that may be witnessed in April by the train traveler between Amsterdam and The Hague. Here, in a space of perhaps twenty square miles, bulb plants of every sort are raised for export to every part of the world.

The other crops of Holland are much like those in any European country. Garden vegetables are raised for export, and potatoes, sugar beets and grains for home markets. There is little timber in the country.

Other Dutch Occupations. Naturally, since over ninety per cent of the country consists either of glacial or river deposits, mining is practically unknown in Holland; there is, in fact, but one mine in the country, a large government-managed coal mine in Limburg. With so little coal or water power to encourage manufacturing, trade and commerce ranks next to agriculture in the number of people it engages. Besides shipment of farm products to the neighboring countries of Europe, a vast trade is carried on in connection with Java, Sumatra and the other Dutch possessions. Cocoa, coffee, tobacco, sugar, tea, spices and other characteristic products of the Indies are imported in a

TWO METHODS OF TRANSPORTATION

raw state and prepared for export to other countries, and cotton cloth and other needs of the East Indians are manufactured and sent to them. The importance of Rotterdam as a port is increased by its connection with the Rhine;

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thousands of tons of goods for Germany, Switzerland and Austria are carried up the river in Dutch boats. The Netherlands has always been virtually a free-trade country.

Two at least of the minor industries of the Netherlands are famous. These are the manufacture of pottery at Delft, and the cutting of diamonds by the Amsterdam Jews. Fishing is important to the villages of the coast; there are oysters and small fish (see SPRAT) in the waters at home, but many of the 25,000 fishermen are busy from May to November in the herring fisheries north of Scotland. It is sometimes said that the invention of the process of curing herrings, in the Middle Ages, was the cause of the rise of the Dutch to greatness, and it is recorded that Emperor Charles V visited the inventor's grave and ordered a monument for him.

Rivers, Canals and Railroads. Although only five nations in the world have in proportion to their area more miles of railroad than Holland, this remarkable little country has an even greater extent of water transportation. There are a little over 2,000 miles of railways, almost the same length of canals and about 3,000 miles of navigable rivers and channels. In the polder regions the canals are often above the level of the fields. Many villages are miniatures of Venice, and even in the larger cities much of the transportation is by boat. More than half the railroads are state owned.

The main stream of the Rhine flows into the River Waal soon after it reaches Holland, and is joined a little farther by the Meuse (or Maas). Rotterdam, which ranks with Antwerp, Hamburg, London and New York in its export and import tonnage, it situated on one of the channels of the Rhine-Maas-Waal, but in recent years the channel mouth has become so blocked with mud that a deep-water canal, finished in 1890, was constructed to the sea, a distance of twenty miles. Amsterdam formerly was entered from the Zuider Zee, but it, too, has been connected with the North Sea by canal.

Cities. Amsterdam, though not Holland's largest port, is its largest city. Amster-

SCENES IN THE NETHERLANDS

Above, canal and windmills; in center, church at Delfthaven in which the Pilgrims held their last service before returning to England to sail for America; bottom, tree-lined canal at Delft.

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dam's inhabitants number about 600,000, Rotterdam's less than 500,000, but Rotterdam is growing much the more rapidly. The Hague, the nation's capital and the seat of The Hague Tribunal, has 300,000 people. Its true name is *'s-Gravenhage*. Utrecht is the only other city of over 100,000, but there are twenty-six others with more than 20,000. In Maryland, the American state nearest Holland's size, there is one city about the size of Amsterdam, and only one other over 20,000.

Government. Till the French Revolution Holland was the foremost champion of liberty on the European continent, but having learned under French domination the sordid side of republicanism, the Dutch people decided after the fall of Napoleon to have a king. The constitution of 1814, with amendments, is still in force. Under it Queen Wilhelmina has executive power, and a slight measure of legislative power as well, for acts of the *Staten Generaal,* or Parliament, are submitted to her before being voted on as well as after. In addition she may at any time dissolve either or both sections of the States-General. The upper half of the Parliament, called the *Eerste Kamer,* or First Chamber, corresponds to a Senate. Its members are chosen by the legislature, or *Staten,* of the eleven provinces and serve nine years, one-third of them retiring every three years. The *Tweede Kamer,* or Second Chamber, contains 100 members, twice as many as the First, and they are elected by the people. Since 1916 all men over twenty-three have the right to vote, which before was limited to taxpayers, householders and wage earners.

All national legislation originates in the lower house, the upper chamber lacking even the power to amend the bills sent to it. But with the caution so characteristic of the Dutch, financial matters are kept entirely out of the hands of the States-General, instead of being in the control of the lower house as in most countries. The Minister of Finance prepares an annual budget which he presents to a special commission of seven, appointed for life by the queen.

A Council of State shares with the sovereign the governing power. It is distinct from the Cabinet, which is like those of other European nations in being responsible to the States-General. The Council of State has fourteen members and a vice-president. The sovereign presides, and the heir apparent, when of age, is also a member.

The Cabinet Ministers, who are frequently, though not necessarily, members of the States-General, may attend all sessions of that body and may speak to any question, whether they are members or not. Only the members may

NATIONAL PALACE
The official residence of Queen Wilhelmina.

vote. Usually there are twelve Cabinet members, three without portfolios and nine others presiding over departments of Interior, Foreign Affairs, Finance, Justice, Colonies, Marine, War, Communications, and Agriculture, Industry and Commerce.

The legislatures of the provinces consist each of one chamber. They may legislate in all matters of provincial welfare, but subject to the approval of the queen. Communities have councils and mayors, but they are subject to the legislatures of the provinces, and their ordinances may be vetoed by the queen.

The Empire. Holland's colonial possessions, aside from Surinam or Guiana, and Curaçao, are all in the East Indies. Java is the most important of them, for it contains about 30,000,000 people. In area, however, Borneo, New Guinea, Sumatra and Celebes are larger. Most of the people of the islands are Mohammedan.

The eastern colonies, a list of which will be found in the article East Indies, Dutch, are administered by a Governor-General and a council of five appointed for four years by the queen, who may pass laws except in matters which, according to the constitution, remain in the hands of the legislature at The Hague. The natives are actually governed through a complex system of officials of their own race, who sometimes receive commissions on the amount of taxes they collect. In general the Dutch are very lenient rulers, often criticized by other nations for their laxity in allowing native customs to continue; on the other hand, they systematically force the output of the islands to be kept up to its maximum level. Only in Sumatra and Lombok have they had to wage war to conquer the natives.

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OUTLINE AND QUESTIONS ON THE NETHERLANDS

Outline

I. Position and Size

(1) Location relative to other European countries
(2) Area
  (a) Actual
  (b) Comparative

II. Physical Features

(1) A low-lying country
  (a) Average elevation
  (b) Greatest elevation
  (c) The dikes
(2) Of alluvial formation
(3) Rivers
  (a) Rhine
  (b) Meuse
  (d) Scheldt

III. Industries

(1) Agriculture
(2) Dairying
(3) Manufactures
(4) Fishing

IV. Transportation and Commerce

(1) Railroads
(2) Rivers and canals
(3) Important articles of trade

V. The People

(1) National characteristics
(2) Likeness to Germans
(3) Religion
(4) Education
(5) Language
  (a) Dialects
(6) Literature
(7) Painting
  (a) Many great names
(8) Population and cities

VI. Government and History

(1) Powers of ruler
(2) The two legislative chambers
(3) Local government
(4) Colonies
(5) Early history
(6) Feudal system and independence of cities
(7) Center of Liberalism
(8) Conflicts with Spain
(9) Rise to power
(10) Commercial supremacy
(11) Encounters with the French
(12) Napoleonic era
(13) The modern kingdom

Questions

What novel method of checking the advance of a French army did the Dutch people resort to?

How many European countries are smaller than the Netherlands?

What does the word *stadtholder* mean? Who was the most famous stadtholder?

What do the inhabitants of the country call themselves? From what is their English name derived?

What important part did the Dutch play in the history of the United States?

What Dutch document corresponds to the English Magna Charta?

How do you spell a Dutch word that sounds like *ice?*

What famous tribe lived in this region in the time of Caesar?

Name two famous painters of the Netherlands and tell for what they stood.

How long has the country had its present constitution?

What does the name Netherlands mean? Why is it especially appropriate?

What is the real name of the capital of the country? What has attracted special attention to it in recent years?

What is the railway mileage to each hundred square miles of area? How many nations surpass Holland in this respect?

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History of the Netherlands

The story of the present kingdom of the Netherlands is bound up with that of Belgium, for during part of their history these two have been united and until 1830 the term *Netherlands* included both countries. The word *Holland,* on the other hand, formerly referred, not to the nation, but only to the two provinces in it which were once the County of Holland.

In Roman times the Netherlands were the home of three tribes, the *Belgae* (of whom Caesar tells us), the *Batavi* and the *Frisii,* whose names survive in *Belgium,* in *Batavia,* the metropolis of Java, and in *Friesland,* one of the Zuider Zee provinces. Before Charlemagne's day most of the tribes had been Christianized, and all formed a part of his empire. In the division which followed, the land east of the Scheldt fell to the middle kingdom, afterwards being alternately under East and West Frankish dominion. Thus it came about that there were three languages in the Netherlands: Walloon French, Dutch, and Flemish, which resembled both.

Under the feudal rule the quarrels between the numerous petty rulers in the Netherlands made it possible for a number of the towns to obtain practical independence. The men of the south were weavers, but those of the north were fishermen, mariners and traders. In the fifteenth century several towns jointly fitted up a fleet, which attacked the Hanseatic League and gained freedom for their commerce. Dutch vessels grew in number and the Dutch merchants became the wealthiest of the world. Their city fleets fought even the king of France. Protestantism had a firm hold a century before Luther, and with the advent of the printing press the Low Countries became a center of liberalism. Thus the Netherlands enjoyed prosperity and comparative independence while the rest of Europe knew little but war, oppression and turmoil, and it was natural that they should become the scene of a mighty struggle for liberty.

In 1477 the Netherlanders forced Mary of Burgundy to sign "The Great Privilege," the Dutch Magna Charta, which left to the sovereign even less power than the queen has to-day. Charles V, ruler of nearly all Europe, was born in the Netherlands and felt an interest in its people, but his heavy taxes caused revolts in Bruges and Ghent. His son Philip II, a thoroughgoing Spaniard, did his best to stamp out Protestantism with the Inquisition, but under the leadership of the great William the Silent the Netherlanders drove out the Spanish garrisons.

Though Spain was at this time ruler of over half the world, and the Netherlands was but a tiny corner of it, the conflict between them—which lasted, with slight intervals, from 1567 to 1648—resulted in Spain's financial ruin and Dutch rise to international power. Hitherto the Dutch had been excluded from the Spanish Indies; now they grew rich in its commerce. France and England, enemies of Spain, gave to the Dutch privileges of trade, and Amsterdam became Europe's greatest commercial city, with a population larger than it had in the middle of the nineteenth century. It was at this period that the Dutch settled New York.

But this very prosperity prevented the political advancement of the nation. The merchants of the province of Holland opposed the military activities of their *stadtholders,* or state guardians, William the Silent and his successors, because they did not want the rival towns of Flanders, and Antwerp with its wonderful harbor, included in the nation and sharing their advantages. The Protestants, too, persecuted their Roman Catholic brethren, who predominated in the Belgian Netherlands. Holland province even undertook to negotiate treaties over the head of the States-General, and it was due to Holland's aggression that in 1648 the United Netherlands signed a treaty of peace with Spain, thus breaking its pledge to its ally, France, and leaving the Belgian Netherlands in Spanish hands. By this treaty the independence of the United Netherlands was recognized, and the River Scheldt was closed to commerce, a step which caused the ruin of Antwerp, Amsterdam's rival.

The year 1650 is usually considered the turning point in Dutch history. Twenty years earlier the office of stadtholder had been made hereditary, but upon the sudden death of William II, who in his two years' rule had thoroughly cowed the merchant politicians of Amsterdam, the governing power fell largely to one Jan De Witt. In his time the Netherlands fought two naval wars with England, provoked largely by the latter's commercial jealousy. The first, against Cromwell's Parliament, began in 1652; the second, against Charles II, in 1665. Though the Dutch carried nearly all the world's trade in their merchant ships, their navy was small, and success and failure alternated.

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In 1672 the aggressive Louis XIV of France invaded the Netherlands, and took several towns in rapid succession, for De Witt and his party had disbanded most of the army. But again the House of Orange rescued the nation. Prince William, twenty-one years old, persuaded the people not to heed De Witt's advice of surrender, but to open the dikes and flood the land over which the French must advance. The prince later became King William III of England, and during his reign carried on almost constant war with France.

In the succeeding years Dutch prominence in international affairs declined, and the nation lost some of its colonies and much of its trade. At times the princes of Orange were in power, at other times the burghers. In 1794 came the end of the United Netherlands, for the army of the French revolutionists, advancing when the country was frozen over, took Amsterdam. The Batavian Republic was organized, which in 1805 gave way to Napoleon's rule. During this period, because of their connection with the French, the Dutch lost some of their colonies, including the Cape of Good Hope, to the English, and witnessed the ruin of their trade.

When the present kingdom of the Netherlands was formed at Napoleon's downfall, a prince of Orange became King William I. The Congress of Vienna, in fixing the new boundaries, included the Austrian Netherlands within them and gave Luxemburg to the same ruler; but in 1830 the former territory revolted and became the kingdom of Belgium, while the latter was taken from the House of Orange when Queen Wilhelmina came to the throne in 1890, because its law did not then permit a female ruler.

In the great War of the Nations, which began in 1914, the position of the Netherlands was exceedingly embarrassing. It was a small, comparatively weak nation, with sympathies naturally leaning towards Germany, with whom its trade relations were important. In the first month of the war Belgium was overrun by German armies, and this act served as a hint to Holland that the same fate might await her. The strictest neutrality was enforced, and Holland sought valiantly to protect its self-respect and meet such demands upon it as were possible without incurring the enmity of other warring powers. The blockades instituted by the nations affected the people severely, and several times brought them to the point of actual want for the necessities of life. For details, see WAR OF THE NATIONS. G.E.DE V.

Consult Jungman's *Holland;* Meldrum's *Home Life in Holland;* Van Loon's *Rise of the Dutch Kingdom.*

Related Subjects. The following articles in these volumes will be found helpful by the reader interested in the Netherlands:

CITIES

Amsterdam	Hague, The
Arnhem	Leyden
Delft	Rotterdam
Groningen	Utrecht
Haarlem	

HISTORY

Belgium, subhead *History*	Ruyter, Michael A. de
Bonaparte, subhead Louis Bonaparte	Stadtholder
Charles V	Tromp, Martin H.
Philip II	Wilhelmina
	William I, Prince of Orange

ISLANDS

See list, with article ISLAND.

LEADING PRODUCTS AND INDUSTRIES

Cheese	Pottery
Dairying	Tulip
Hyacinth	

WATERS

Meuse	Y, The
Rhine	Zuider Zee
Scheldt	

NETH'ERSOLE, OLGA (1870-), an English actress who won fame through her impersonations in emotional rôles. She was born in London and made her début in that city in 1888. Later she toured Australia, and afterwards made her first appearance in the United States in 1894. In such plays as *Sapho, Carmen, Camille* and *The Second Mrs. Tanqueray* she aroused enthusiasm, and in some of the rôles undertaken she was without a rival. In 1906, under her own management, she presented a repertory of her most successful plays at the Sarah Bernhardt Theater in Paris, and after her return to the United States in 1910 appeared in Maeterlinck's *Mary Magdalene,* in *Sister Beatrice* and in *The Awakening of Helena Ritchie.*

NETTLE, *net''l,* a genus of plants containing about thirty species, most of which are herbs covered with fine, needle-shaped hairs. The hairs contain a bitter, watery juice, which produces a painful wound if it enters the skin. Careless handling of a nettle plant is therefore a foolhardy procedure. Several species are useful to man through the fiber furnished by their stems; this fiber is employed in making cordage, paper, thread and grass cloth. *Nettle beer* is a beverage made from leaves, and nettle tops or young shoots are sometimes eaten as a vegetable. The species are distributed through the

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temperate regions in both the Eastern and the Western hemispheres.

NETTLE TREE, a North American tree greatly resembling the common elm, and belonging to the same family. It is also called *hackberry* and *sugar berry,* and is found in Southern Canada, west to Puget Sound, and south to Florida, Tennessee, Missouri, Texas and New Mexico. The nettle tree grows from fifty to 125 feet high, sending up a slender trunk covered with rough, brown or pale-gray bark. It may be distinguished by its branches, which are less drooping and more horizontal than those of the elm, and by its leaves, which are smaller and of a brighter green color. For shade and ornamental purposes the nettle tree is very satisfactory, and should be planted more commonly than it is, because the birds love its sweet berries, which hang on the branches all winter. The wood is coarse grained and not very strong, but is utilized for making fences and inexpensive furniture.

There are several other species of nettle tree, found in Europe, Asia and South Africa, and there is also a smaller species of American hackberry. The latter is found in the Ohio and the Mississippi valleys. The European species is valued for its hard wood, which takes a high polish. Shafts, axletrees, oars, hoops, walking sticks, whipstocks and hayforks are made from various parts of this tree.

NEUCHÂTEL, *nuh sha tel',* a town in Western Switzerland, on the banks of the Lake of Neuchâtel, capital of the canton of that name. It is twenty-five miles west of Bern. Built on a slope rising from the shores of the lake, the place has a charming situation. Among its interesting features are an abbey church dating from the twelfth century, and the old castle of the counts of Neuchâtel, now used as a government building. Many fine public buildings, a university, museums of art and natural history and a well-equipped public library bear witness to the progressiveness of the town. Neuchâtel is a railroad center of considerable importance; the chief industries are watchmaking and the manufacture of jewelry and electrical apparatus. Population in 1910, 23,505.

Lake of Neuchâtel, the third largest lake of Switzerland, and the largest lying wholly within that country, of historic interest as the former location of a group of lake dwellers (see LAKE DWELLINGS). It is situated in the western part of the republic, occupying portions of the cantons of Neuchâtel, Vaud, Fribourg and Bern, and has an area of about ninety-two square miles. On its shores are a number of towns and villages, and several rivers flow into it. The lake is practically an expansion of the River Thièle, which enters it at the southwestern end and flows out again at the northeastern. Neuchâtel, the most important town on its banks, is connected by steamers with Estavayer, a town of historic importance situated on the southeastern shore. There are attractive forests and vine-clad slopes along the lake; in other portions the shore is low and swampy.

NEURALGIA, *nu ral' ji a,* as most commonly used, a term applied to pain in the nerves of the face and head. Neuralgic pains, however, may occur in other parts of the body, as in the hip and thigh (sciatica), or the stomach (gastric neuralgia). Neuralgia differs from neuritis (which see) in that it is a symptom of disease or of unhealthful conditions; neuritis is a disease of the nerves themselves. The chief symptom of neuralgia is pain. In some cases this takes the form of a dull, long-continued ache; and in others there are attacks of limited duration but of almost unbearable severity. Many sufferers find that the pain is more intense at night.

Anaemia (which see) is one of the most frequent causes of the ailment, but facial neuralgia may be the result of unhealthful conditions in the eyes, nose or teeth. In many cases cures have been effected by attention to these parts. Anyone subject to neuralgic attacks should endeavor to improve the general health of the body by rest and careful dieting to build up impoverished blood and weak tissues. "Neuralgia is the prayer of a nerve for healthy blood" is the definition of one physician. Exposure to cold and dampness should also be avoided. Drugs to relieve intense pain are sometimes helpful, but should never be taken except when prescribed by a reliable physician. Neuralgia may be a symptom of several diseases, including gout, rheumatism, diabetes and malaria, and the chief remedy in such cases is treatment of the disorder. S.C.B.

For a special form of facial neuralgia, see TIC DOULOUREUX.

NEURASTHENIA, *nu ras the' ni a,* from two Greek words, *neuron,* meaning *nerve,* and *astheneia,* meaning *weakness,* is a name for general exhaustion of the nervous system. The majority of cases are caused by dissipation, worry, bad habits of eating and, occasionally, by overwork. In most instances the patient is suffering from poisons developed in the system by constipation, infected tonsils, decayed teeth,

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etc. The excessive use of tea and coffee is a common cause of neurasthenia. The disorder is so common in the United States that it is sometimes called the *American disease*. The neurasthenic worries continually, is exceedingly self-centered and often suffers from inability to sleep, indigestion and poor circulation. The sufferer is also given to undue depression or excitement and is likely to be overemotional. There is often fear which takes a peculiar form, as fright at being in enclosed places, fear of crowds, fear of being alone or fear of falling; or, at times, continual brooding will affect one special function and the patient will think himself unable to talk, unable to hear, etc. It sometimes develops in overindulged, weak-willed children, and as a result of severe shock. Rest, the abandonment of wasteful habits, such as the use of stimulants of any kind, relief from worry and hygienic living will cure it in its earlier stages, but seriously-developed cases require the services of a specialist.

NEURITIS, *nu ri' tis,* a disease of the nerves which occurs in two forms, *localized* and *multiple.* Localized neuritis may result from exposure to cold or from injury to a nerve, such as pressure from a dislocated joint. Slight attacks may last but a few days, but more severe cases sometimes endure for months or years. Severe pain along the path of the affected nerve is the first symptom, accompanied by tenderness in the muscles through which the nerve is distributed. A long-standing case of localized neuritis will cause numbness and wasting of the muscles, and if the arms and hands are affected the patient becomes almost helpless. Multiple neuritis is sometimes caused by infection from various diseases or by lead and other forms of poisoning, but the most common source of the disorder is excessive use of alcoholic liquors. The symptoms of multiple neuritis include acute pain in the head, back and legs, serious impairment of the power to use the arms and legs, wasting of the muscles and, in case of alcoholic neuritis, delirium and convulsions. All cases require the attention of a reliable physician. S.C.B.

NEUROPTERA, *nu rop' ter a,* from two Greek words meaning *nerve* and *wing,* is an order of insects whose distinguishing characteristics are their netted-veined wings, biting or piercing mouth parts and complete development from the larval to the adult stage (see METAMORPHOSIS). According to modern classification the order is now divided into seven families, which show great variation in structure and habit. Representative of the Neuroptera are the alder fly, fish fly, ant lion and dobson fly. The May fly, stone fly and dragon fly, formerly included in the order, are now considered as forming separate orders. Nearly all members of the order Neuroptera live on the land in immature and adult stages, but the larvae of a few forms are aquatic. See INSECT.

NEUROSIS, *nu ro' sis* (plural *neuroses*), a Latin word form from a Greek word, *neuron,* meaning *nerve.* The term is applied to nervous disorders which do not originate in a wound or in a disease which changes the physical structure. Neuroses generally arise from a bad state of mind—a morbid mental condition which reacts on the health of the patient. People of imaginative, oversensitive or hysterical temperament are most apt to develop the malady. Drugs are of no value, except such as may calm the patient. The treatment is entirely mental, performed by appealing to the sufferer's reason, and encouraging him to regain self-control. There is also *occupational neurosis,* such as *writer's cramp,* which is marked by numbness and inability to write. It is brought on by muscle fatigue in persons of nervous temperament.

The term is used in psychology and physiology to denote the neural processes which are believed to be correlated with all mental processes. It is the view to-day that there can be no mental act that is not associated with a nerve process. See NEUROTIC, below.

NEUROTIC, *nu rot' ik,* from the Greek *neuron,* meaning *nerve,* is a word which originally had the same meaning as *nervous.* However, it now has come to have a more specific significance, being used to describe a person suffering from some nervous disturbance, such as hysteria, or one who is of a highly nervous temperament.

Until recently *neurotic* was used in medicine to designate drugs which affect the brain centers which govern intellect, sensibility and movement. Alcohol, strychnine and opium are examples of neurotic drugs. See NEUROSIS.

NEUTRALITY, *nu tral' i ti.* When two or more nations engage in war, other nations that decide to take no part in the conflict but to conduct themselves so that they can retain the friendship of the warring powers, are called *neutral* nations. The condition which exists under such circumstances is spoken of as *neutrality.* Neutral nations, however, have certain duties which they must perform if they desire to be regarded as neutral, and they are entitled to certain rights, which must be granted them

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by the nations engaged in war. The formulation of these rights and duties constitutes one of the most important divisions of international law, which concerns itself with defining relations between nations.

All duties of neutrals rest upon the principle that no direct military assistance shall be rendered to belligerent nations; it must not allow its territory to become in any way a base of operations against either, as would be the case if the passage of troops across it were permitted. It must not allow ships of the contending powers the protection of its ports, save for a limited time, or to make necessary repairs. However, if soldiers of one belligerent, to escape the enemy, enter the territory of the neutral, they will be granted protection, though they become virtually prisoners of war in charge of the neutral until the close of hostilities.

One of the most important rights of a neutral is that of transporting merchandise, even though belonging to one of the warring nations, in ships under its neutral flag, safe from capture by the enemy's ships, provided the goods in passage are not such as would assist warlike operations. But belligerent ships have the right to detain and search neutral vessels suspected of carrying forbidden goods; if such are found, the goods themselves are confiscated, and in some cases, the ship and entire cargo are included. A neutral nation is not bound to prevent the transport of forbidden goods by the ships of its citizens or subjects, but it must acquiesce in the loss that may devolve upon the owners of the ship in case of capture.

That "history repeats itself" is a time-worn adage. Neutrality agreements have been broken since men have first disagreed; the earliest recorded version of an interesting violation is found in the book of *Numbers* (XXI; 21), and is remarkably similar to the experience of Belgium in the War of the Nations, in 1914, nearly 3,400 years later:

> And Israel sent messengers unto Sihon, king of the Amorites, saying,
>
> Let me pass through thy land: we will not turn into the fields, or into the vineyards; we will not drink of the waters of the well: but we will go along by the king's highway until we be past thy borders.
>
> And Sihon would not suffer Israel to pass through his border: but Sihon gathered all his people together, and went out against Israel into the wilderness: and he came to Jahaz, and fought against Israel.
>
> And Israel smote him with the edge of the sword, and possessed his land. . . . . F.ST.A.

Consult Fenwick's *Neutrality Laws of the United States;* Wicker's *Neutralization;* Moore's *American Diplomacy, Its Spirit and Achievement.*

NEVA, *ne'va,* a short river of Northwestern Russia, the outlet of Lake Ladoga and the "finger lakes." It flows westward from the southern end of Lake Ladoga for about forty miles, emptying through a delta into the harbor of Kronstadt, an inlet of the Gulf of Finland. It is on the low, marshy delta of the Neva that Petrograd is built. The stream is very important as a waterway, being the last link in the Ladoga-Volga system connecting the Baltic and Caspian seas. Though it is very wide and deep in most places and has a great volume of water from the lakes, it was found necessary to construct extensive engineering works to make an artificial channel through the shallow waters of the delta. See PETROGRAD.

NEVADA, *ne vah'da,* popularly known as the SAGEBRUSH STATE, and one of the Pacific group, is the most arid and most sparsely-settled state of the American Union. Its name, originally applied to the snow-capped mountains of the Pacific slope, is derived from a Spanish word meaning *snow clad,* and refers to the snowy summits of the state's many mountains. The state lies almost entirely within the Great Basin, between the Sierra Nevada and

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Wasatch mountains. Ranking sixth in size among the states of the Union, Nevada has an area of 110,690 square miles, about 3,000 square miles less than that of Arizona and a little less than five times the area of Nova Scotia.

The People. There are fewer inhabitants per square mile in Nevada than in any other state of the Union, the average population being 0.7 per square mile in 1910, as compared to 30.9 for the United States. The inhabitants numbered 81,875 in 1910, about one-sixth of the population of Nova Scotia. Of this number 56,277 were native born, 17,999 were whites of foreign birth (chiefly Italian, German, Canadian, English and Irish), 5,240 were Indians, 1,791 were Chinese and Japanese and 513 were negroes. The population on January 1, 1917, was estimated at 108,736. There are fifty cities of the United States having a greater number of inhabitants than this entire state. The Indian population consists of Piute, Shoshoni and the remnants of a few other tribes. Reno is the largest city, although its population in 1916 was only 14,869 (Federal estimate). Goldfield, Tonopah, Carson City, the capital, and Virginia City, all having fewer than 5,000 people, are the other chief towns.

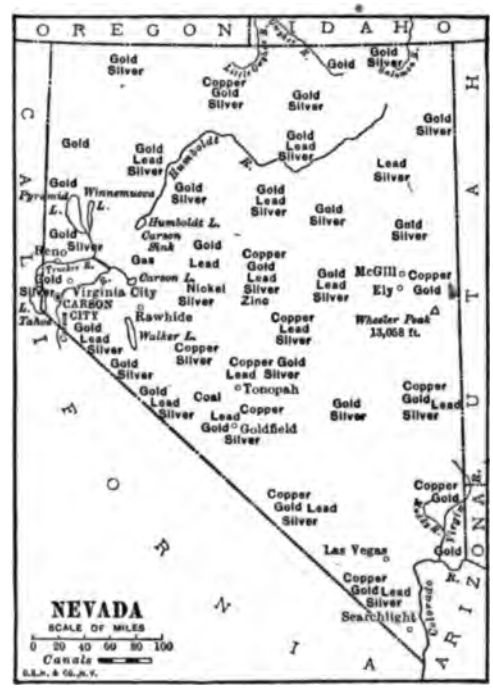
The number of Roman Catholics is more than three times that of all Protestants, the largest denominations of which are the Episcopal, Methodist, Presbyterian and Baptist, ranking in the order named. The Mormons, or Latter-Day Saints, rank next to the Episcopalians in the number of adherents.

Education. Nevada has had to deal with the problem of administering a school system covering an extensive and thinly-populated area. The public schools are well supported by the income from government lands, a special state tax and by local taxation. At the head of the school system is the state superintendent of public instruction, who is elected by the people for a term of four years. A compulsory education law has been passed, but owing to the great distances between towns and settlements, the illiteracy is 6.7 per cent, over three times as great as that in the adjoining state of Idaho. There is a total enrolment of about 12,000 pupils in the elementary schools.

Modern methods have been introduced in the schools. In 1914 manual training was taught in nine elementary and six high schools; instruction in agriculture was given in several high schools, and some industrial art was taught in fifty rural schools. Normal schools at Eureka, Yerington and Tonopah, a mining school at Virginia City and the state university, at Reno, are maintained by the state. The rapid development of Nevada is closely interwoven with the growth of its university, which gives instruction in mining and other branches of technology, and maintains an agricultural experiment station and model stock farms. The university has been richly endowed by Clarence Mackay of New York, whose father made much of his wealth in Nevada gold.

Other state institutions are a hospital for the insane at Reno; an orphans' home and the state prison at Carson City and an industrial school at Elko. In June, 1915, the Nevada School of Industry, a reform school for boys, was opened. Several industrial schools for Indians are maintained by the Federal government. The deaf, blind and feeble-minded are cared for at the state's expense in institutions in California.

The Land. Nevada is an arid table-land, 2,000 to 6,000 feet above the sea, broken by numerous mountain ranges rising to elevations



OUTLINE MAP OF NEVADA

Showing boundaries, chief rivers, principal cities, location of mineral deposits and the highest point of land in the state.

of 7,000 to 10,000 feet, by buttes and mesas, and intersected by a series of long, parallel valleys. The southeast corner is the only part of the state with an elevation of less than 2,000 feet. The lowest point, 700 feet above the sea, is in

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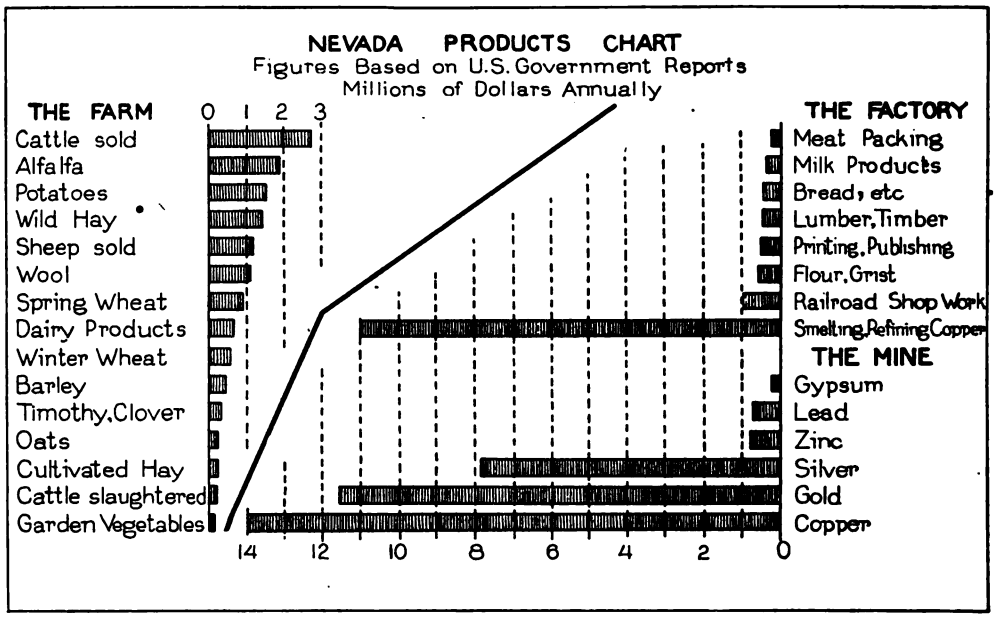
the canyon of the Colorado River. The mountains, scarred by torrents and well-worn passes, are covered with only a straggly growth of timber. Humboldt Range, near Utah, is the most lofty and rugged, and one of its peaks, Mount Wheeler, with an elevation of 13,058 feet, is the highest mountain of the state. Although no sections except the "alkali flats," which are great mud beds covered with dazzling white salt, are devoid of vegetation, there are no green or flowered fields except where irrigation is practiced, and the valleys are covered with the dull, dusty sagebrush, greasewood and creosote bushes.

The lakes have no outlets, and their brackish waters contain one-tenth as much salt as the water of the sea. Pyramid Lake, thirty-one miles long, seven to eleven miles in width and of great depth, is the largest body of water in the State. Lake Tahoe, on the California boundary, 6,225 feet above the sea, its waters deep and clear, is one of the most beautiful lakes in America, and is visited by many tourists.

Climate. The climate of Nevada is mild and excessively dry. The winds are strong, but the skies are usually cloudless. The high altitude causes a large daily range in temperature; even



Rivers and Lakes. Few of Nevada's streams find an outlet to the sea, but the Owyhee, draining the northeast corner of the state, flows into Snake River, and the extreme southeast corner is drained by the Colorado. Over a great part of the state streams flowing only during the wet season empty into wide, shallow swamps or "sinks," from which the water evaporates during the summer months, leaving hard mud flats. In the north, the mountain snows make the streams more permanent. The Humboldt, Nevada's largest river, flows across the state in a crooked channel for 375 miles and empties into Humboldt and Carson sinks. Walker, Carson and Truckee rivers are other important streams, and their waters are diverted for irrigation purposes (see subhead *Irrigation,* page 4135).

in the hottest weather, the nights are cool. The lofty Sierra Nevada Range protects the state from violent western storms; the winters are mild, the temperature usually rising above freezing during the day. The average annual temperature of the state is 49.6° F. The rainfall is chiefly during the winter months and is greatest on the mountains, though it varies widely at different elevations. Except on the mountain summits, snow lies on the ground but a few days each year. There are long seasons of drought when water is most needed for agricultural purposes, and the annual rainfall averages but ten inches a year. However, the invigorating dry air, sunshine and mild winters make the climate healthful and pleasant.

Agriculture. In Nevada agriculture depends upon irrigation, and in 1910 the improved land

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in farms covered only 752,117 acres, the average farm being 1,009 acres in size. Ranches containing from 50,000 to 100,000 acres of arid land are devoted to grazing, which is the most important branch of the agricultural industry, and the valleys are sometimes overrun with wild horses. In January, 1916, the live stock of the state, as estimated by the United States Bureau of Agriculture, comprised 25,000 milch cows; 472,000 other cattle; 1,532,000 sheep; 77,000 horses; 3,000 mules; 40,000 swine. The income from dairy products is nearly $1,000,000 annually.

Recent agricultural improvements are doing much to overcome the lizard-hiding sagebrush, and the soil when reclaimed is well adapted to the raising of forage crops, cereals, vegetables and fruits. Although Nevada does not rank high among the states in the total amount of any of these crops, intensive cultivation in the irrigated districts produces a large crop per acre. With an average yield for ten years of over thirty bushels, Nevada ranks first among the states in the production of spring wheat per acre, but only fourteenth in the total amount produced. In winter wheat the yield is twenty-five bushels per acre, exceeded only by five states, all of which practice irrigation, but in total production Nevada's rank is only thirty-eight. Elko is the banner county of the state.

The chief crops are hay and forage, about 800,000 tons; potatoes, 2,000,000 bushels; wheat, 1,500,000 bushels; oats, 650,000 bushels; barley, 600,000 bushels. The production of hay and forage increased fifty per cent between 1909 and 1914, and the output of potatoes in 1915 was nearly three times the crop of the first year named. In both irrigated and unirrigated sections apples and other orchard fruits, grapes, raspberries, loganberries, gooseberries, strawberries and currants are cultivated. In 1907 and 1908 a plague of Carson field mice greatly damaged the crops; the state agricultural station is studying methods for preventing and destroying such pests. The public lands are open to settlement free of charge except for payment for drainage and water. Nevada ranks first among the states in the extent of its public lands.

Irrigation. In 1910, 93.3 per cent of the improved land in farms was artificially watered land, and there were in the state 3,151 miles of irrigation ditches. The three principal irrigating districts are along the Humboldt River, in the valleys of the Carson, Truckee and Walker rivers, and at the foot of the mountains along the western border. Near the mouths of desert canyons a few intermittent streams furnish some water for irrigation. In 1902 work was begun by the government on the famous Truckee-Carson systems, to reclaim 200,000 acres of desert land. A canal thirty-one miles long, diverting the Truckee River into the channel of the Carson, was completed in 1905. The total cost of the project is estimated at $9,000,000. Irrigating plants are supplying water at a cost of about $12,188,750. The work is superintended by the State Bureau of Industry, Agriculture and Irrigation.

Minerals. Nevada is above all a metal-producing state. In fact, its existence as a state is chiefly due to the wealth of its deposits of gold and silver. One of the richest mineral belts in the world extends along the California border and beyond the Colorado River into Arizona. The development of Nevada's mines began in 1860, with the discovery of the Comstock Lode, rich in gold and silver. Between 1869 and 1879 the Sutro tunnel, four miles in length, extending through a mountain and into the interior of the mine, was built. This is valuable for scientific as well as commercial purposes. The total product of gold taken from this lode between 1860 and 1890 was valued at $340,000,000. After 1890 the vein was practically exhausted, but in 1900 rich discoveries were made at Tonopah, Goldfield and other places in Esmeralda, Nye and Lincoln counties. Since that date Nevada has been one of the leading states in the production of gold and silver. It ranks fourth among the states in the production of gold, and since 1910 has been first in the output of silver. In 1910 its gold production reached a value of $18,873,700, but has been steadily declining since then. Its silver has been above $7,000,000 in value since 1911. Copper, one of the most valuable products of the state, was not important until 1908; in 1915 the value of the copper product was $14,859,845. Lead, zinc, graphite, quicksilver, tungsten, sulphur, salt, iron ore, platinum and mineral waters are also produced. The total value of the mineral products of the state is usually nearly $40,000,000.

Manufactures. With the exception of New Mexico and Wyoming, Nevada is the least important of the states in manufacturing. This is due to the predominance of mining interests and to the great distances between its scattered and small cities. There are fewer than 200 manufacturing establishments, employing in all about 4,000 persons. The total value of

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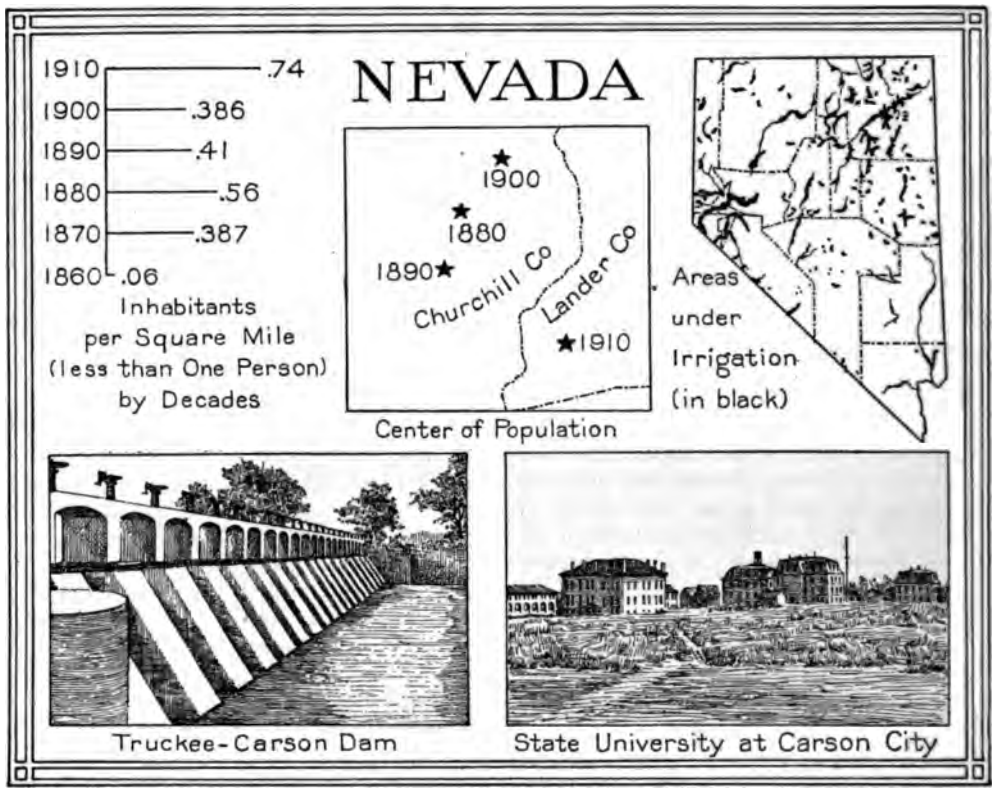

manufactured products is more than $16,000,000. The smelting of ores, car repairing and the milling of flour and lumber are the chief industries.

Transportation. Nevada's industrial growth has always been hampered by the lack of transportation facilities. Until 1869, when the transcontinental railroad was completed, the only way of carrying the products of the mines across the desert was by wagon-train. An unsuccessful attempt was made to domesticate the camel for this purpose. The northern part of the state is now traversed by two great continental systems, the Central Pacific line of the Southern Pacific Company, and the Western Pacific, and several lines extend through the southern section, the most important of which are the San Pedro, Los Angeles & Salt Lake and the Las Vegas & Tonopah railroads. In 1914 there were 2,412 miles of railroad within the state. There is practically no water transportation in Nevada.

Government and History

Nevada has had but one state constitution, adopted in 1864. Amendments may be proposed by either the senate or the assembly, and after being passed by a majority in both houses and in those of two succeeding legislatures they are submitted to the people; if approved by a majority of voters they become part of the constitution. The state adopted woman suffrage in 1914, hence all citizens, male and female, over twenty-one years of age, residing in the state six months previous to elections, are entitled to vote. Being "battle-born," that is, coming into the Union during the War of Secession, Nevada has a peculiar law allowing its soldiers and sailors the right to vote; no matter where they are located, they may comply with a formula and mail their votes home.

The *legislative body* consists of a senate and assembly, meeting biennially on the third Monday in January. Senators are elected for four years and members of the assembly for two years. The total number of members in both houses is not to exceed seventy-five, the senate having not less than one-third or more than

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one-half of that number. The initiative and referendum are in force.

The *executive power* is vested in the governor, lieutenant-governor, secretary of state, attorney-general, state treasurer, comptroller, inspector of mines and surveyor-general. The governor, secretary of state and attorney-general form the board of state prison commissioners and board of examiners, with power to examine all claims against the state.

The *judiciary* consists of a supreme court having a chief justice and two associate judges elected for six years; nine district courts, each having one judge elected for four years; juvenile courts and justices of the peace.

All public officers are subject to recall by the voters of the district from which they are elected. A corrupt-practices act limits campaign expenses to twenty per cent of one year's salary. There are severe penalties for bribery. A workmen's compensation law, child-labor laws, a pure food and drug act and a law forbidding faro and other gambling have been passed in recent years.

History. The first white man known to have entered the territory was Francisco Garces, a Franciscan friar, who passed through it in 1775 on his way to California. In the early part of the nineteenth century Hudsons Bay traders established posts along the Humboldt River. In 1848, by the Treaty of Guadalupe Hidalgo, which closed the Mexican War, the territory was acquired from Mexico and became a county of California. Mormons settled along the valley of the Carson River, to supply gold seekers on their way to California. In 1850 Utah was organized as a territory, including much of the present state of Nevada up to the Sierra Nevada Range. The inhabitants of Carson valley, in 1853 and 1856, claiming that the government of Utah did not protect them, asked to be annexed to California. In 1858 a provisional government was established at Carson City, but the territory remained a remote wilderness until the discovery of gold in 1859.

With the discovery of the Comstock Lode, not only the history of the state began, but the world's finances and the current politics of the United States were greatly affected. There was wild speculation, and miners flocked to the territory from all directions. In 1861 a new territory was organized, the 116th meridian being its eastern boundary, with Utah and 37° N. latitude its southern limit. The next year the territory was extended to its present boundaries, the eastern limit being near the 114th meridian.

Research Questions on Nevada

(An Outline suitable for Nevada will be found with the article "State.")

How much above freezing is the average annual temperature?

What are the most attractive features of the climate?

How did the miners of this region in the early days try to solve their transportation problems?

Why would you rather drink the water of Wisconsin lakes than that of Nevada lakes?

What causes this condition?

How many states have manufactures less valuable than those of Nevada?

Why are the streams of the northern part of the state more permanent than those of the southern part?

For what are the rivers of this state chiefly valuable?

Which would you rather have, the yearly output of the silver mines or that of the copper mines?

Toward what feature of the divorce laws have attempts at amendment been directed?

How much lower is the lowest point in Nevada than the highest point in Illinois?

Is the loftiest point higher or lower than the loftiest point in Colorado? In Wyoming? In British Columbia?

What is the characteristic vegetation of the unirrigated parts of the state?

What connection does the University of Nevada have with the industries of the state?

Why has the school problem been unusually difficult in Nevada?

How many states have fewer people to the square mile?

How does the density of population compare with that of British Columbia? With that of Canada as a whole?

How many cities in the United States have a greater population than this entire state? How many in Canada? (See article CITY.)

If the populations of Chicago and Nevada were transposed, would the state be more or less densely populated than the United States as a whole?

How many cities in the state have more than 5,000 inhabitants?

What does the state name mean?

What is the popular name?

How many states of the Union are larger?

What control have the voters of a district over the public officers elected by them?

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Statehood. The state history of Nevada is largely a history of its mines. In 1863 a convention composed chiefly of miners drew up a constitution, but it was defeated in 1864. The great political crisis of the country, due to the war, made two more Republican votes in the senate desirable, so in March, 1864, Congress passed an enabling act and the state was admitted the following October, bringing into the Union another commonwealth to support the cause against slavery and states rights. The state remained Republican until 1892, when it was carried by the People's party. From 1896 to 1916, inclusive, the state voted for Democratic candidates in Presidential elections, except in 1904, when it supported Roosevelt.

The reaction following the exhaustion of the Comstock Lode was succeeded by a greater development, beginning in 1900 with the discovery of new deposits. In 1906 and 1908 strikes among the miners at Goldfield and other places caused so serious a disturbance that United States troops were sent to preserve order. Efforts were made in 1913 to make the divorce law, which is notoriously lax, more stringent, by requiring a year's residence, instead of six months, but in 1915 the new laws were practically repealed. E.B.P.

Consult Bancroft's *Nevada and Her Resources.*

Related Subjects. The following articles in these volumes may be consulted by the reader:

Carson City	Irrigation
Copper	Nevada, University of
Gold	Reno
Humboldt River	Silver

NEVADA, University of, located at Reno, is the only school of collegiate rank in the state. It had its origin in Federal land grants, and was opened in 1874, existing as a preparatory school for a number of years, at Elko. In 1886 it was moved to Reno and established as the state university. The departments at present are the college of arts and science, the college of education, the college of agriculture, including the schools of agriculture and domestic science, the college of engineering, including the Mackay School of Mines, and the schools of mechanical and civil engineering. The courses in mining engineering are especially strong because of the equipment made possible by gifts from the family of Mackays, and because the rich mining region about Reno offers splendid opportunity for experimental work. Military instruction is given as part of the regular course. There are about fifty members of the faculty and about 450 students.

NEV'IN, Ethelbert (1862-1901), an American composer, born at Vineacre, near Pittsburgh, Pa., who placed music lovers in his debt by *The Rosary,* his most famous composition. He began to attract much attention at the age of ten by his excellent piano playing and became so proficient that when he was twelve years old he was sent to Dresden, Germany, to study the art. In his fifteenth year he returned to Pittsburgh to earn money for further instruction, and before he was eighteen years old had saved enough to study three years with the best teachers in Berlin. In 1887 he settled in Boston and became a well-known teacher and concert player, but in 1893 the charm of Europe, especially Italy, was too strong to be resisted and the next seven years were spent abroad. The influence of Southern Europe is very evident in the dreamy, romantic tone of much of his later music. In 1900 he became a teacher in the music department of Yale University, and was in this work when suddenly stricken with heart-failure. Few composers have excelled him in perfection of melody. His *Narcissus* and *The Rosary* are among the most popular compositions ever written, while his *Day in Venice, Water Sketches* and *'Twas April* have won almost equal public favor.

NEW ALBANY, Ind., the county seat of Floyd County, and a shipping point of importance in the southern section of the state. It is situated on the Ohio River opposite Louisville, Ky., with which it is connected by a long steel bridge. Indianapolis and Chicago are respectively 111 miles and 306 miles northwest. The Baltimore & Ohio Southwestern, the Chicago, Indianapolis & Louisville, the Pittsburgh, Cincinnati, Chicago & Saint Louis, the Louisville & Nashville and the Illinois Central railways enter the city, and steamers connect with Ohio and Mississippi river ports. A branch of the Indiana Traction System operates between New Albany and Indianapolis. In 1916 the population was 23,629 (Federal estimate); in 1910 it was 20,629. Germans predominate in the foreign element. The area of the city is nearly three square miles.

Two miles above New Albany the Ohio River falls in a series of rapids, there being a drop of about twenty feet in the course of two and one-half miles. A canal provides for low-water navigation, and abundant water power is furnished for manufactories, here represented by automobile and furniture factories, tanneries, veneer and planing mills, and one of the largest rolling mills in Southern Indiana. Enormous

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deposits of shale suitable for making tile and brick are found in the vicinity, and the small gardens and farms of the locality produce great quantities of fruits, vegetables, grain, dairy products and poultry.

New Albany has a Federal building, a courthouse, a fine bank building and a Carnegie Library. One of the largest Chautauquas in the United States holds an annual session here. There are three parks, and in the vicinity is a national cemetery. The place was settled in 1813 and was named for Albany, the capital of New York; it was incorporated as a city in 1839. In 1913 the 100th anniversary of the settlement was celebrated.

NEW'ARK, N. J., the largest and most important city in the state and one of the leading manufacturing centers in the United States. It is the county seat of Essex County, and is situated in the northeastern part of the state, about eight miles west of New York City, and on Newark Bay, where it receives the Passaic River. The Central of New Jersey, the Delaware, Lackawanna & Western, the Lehigh Valley and the Pennsylvania railways provide excellent interstate and surburban transportation, which is supplemented by a network of trolley lines and by the rapid transit of the tube line under the Hudson River to New York. Steamboats are engaged in river and coastwise commerce. Many nationalities are represented among its people, who in 1916 numbered 408,894 (Federal estimate); in 1910 the population was 347,469.

Newark is the industrial center for many thousands of people who live in the chain of suburbs lying beyond its limits to the north, west and southwest. Glen Ridge, Irvington, Montclair, Bloomfield, Belleville and the "Oranges" are among these, and Harrison, Kearny and East Newark are on the opposite or east bank of the river. They are all connected with Newark by bridge and by trolley or steam railway. For about a mile from the water the city is level; then it rises in terraces which, with the adjoining suburbs, form an attractive residential section. More than 600 acres of public parks are under the control of the Essex County park commission; the city and its environs are noted for fine boulevards and roads.

Buildings and Institutions. Newark has many fine edifices, among which are the buildings of the life and fire insurance companies which have headquarters here, for, in addition to its importance as a manufacturing city, Newark is noted as an insurance center. Its public library, erected at a cost of $1,000,000, is considered one of the handsomest library buildings in the United States. Other noteworthy buildings are the county courthouse, city hall, Federal building, city hospital and the Roman Catholic Cathedral. Many of the older buildings are built of the brown sandstone found in the vicinity. Newark is the see of a Roman Catholic and of a Protestant Episcopal bishop. Besides the public schools and the public library, Newark has the Newark Academy, a

LINCOLN STATUE IN NEWARK
A remarkable fact regarding this appealing statue is that the lap of Lincoln has been worn shiny by children who like to climb upon the knees.

number of Roman Catholic academies and the State Historical Society; in the vicinity is the city home for boys, where manual training is taught.

Interesting features are an old home on the river bank, the walls of which are constructed of the old walls of Cockloft Hall, delightfully described by Washington Irving in *Salmagundi;* the old home of Peter Schuyler, known as *Peterborough;* and monuments to Seth Boyden, a Newark inventor, Philip Kearny, an American military leader, and Frederick T. Frelinghuysen, Secretary of State under President Arthur, all of whom lived in Newark. It was also the birthplace of Aaron Burr, an American statesman, who mortally wounded Alexander Hamilton in a duel in 1804.

Industry and Manufacture. Because of its extensive and varied manufactures, Newark is frequently called the *Birmingham of America.* The leading industry is the smelting and refining of copper; the leather industry, which ranks

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next, dates from 1698, when the first tanyard was established here, although shoes were made in Newark as early as 1680. In this city, in 1819, Seth Boyden made the first patent leather manufactured in the United States, and in 1828 he discovered the process for making malleable iron. Other important manufactures are jewelry, which has been made here since 1801, foundry and machine shop products, cut glass, hats, thread, campaign buttons, paints and varnish. Slaughtering and meat packing are other important industries.

History. A small company of Puritans from Milford, Conn., made the first settlement here in 1666, when the place was called Milford. Its present name was chosen in 1667, in honor of the first pastor, Abraham Pierson, whose home was in Newark-on-Trent. The town was incorporated in 1693. Newark was the seat of the College of New Jersey (now Princeton University) from 1748 until 1756, when it was removed to Princeton. In 1776 Washington had his headquarters here. In 1836 the city charter was granted and in the same year Newark suffered heavy loss by fire, which was followed by a business panic in 1837. The township of Orange was set off in 1806 and that of Bloomfield in 1812. Vailsburg was annexed in 1905.

NEWARK, Ohio, the county seat of Licking County, situated east of the center of the state, and thirty-three miles east and north of Columbus, the state capital. It is on the Licking River and the Ohio Canal, on the Baltimore & Ohio and the Pittsburgh, Cincinnati, Chicago & Saint Louis railroads, and on electric interurban lines. The population, which was 25,404 in 1910, had increased to 29,635 in 1916 (Federal estimate). The area of the city is about five square miles.

Newark is situated in a broad valley, surrounded on three sides by low hills. It is the site of ancient earthworks of the mound builders, including a large circular embankment and remains of fortifications. The prominent features of the city are the courthouse, public library, Y. M. C. A. building, well-equipped county fair grounds, Buckeye Lake and Moundbuilders Park. An appropriation of $190,000 has been made (1916) for the new Federal building. At Granville, six miles distant, is Dennison College. Newark has important industrial establishments, including shops of the Baltimore & Ohio Railroad, engine and machine works and large manufactories of stoves, rope, glassware, electric cars, golf sticks, farming implements, chemicals, cigars and shoes. Newark, named after Newark, N. J., was settled in 1801 and was incorporated as a city in 1826.

NEW BEDFORD, Mass., a city famous for its manufacture of cotton goods, ranking first in the United States in the production of fine cotton yarn. It is a port of entry and one of the county seats of Bristol County, and is situated on the southern coast of the state on the Acushnet River, which below the city widens into a harbor that enters into Buzzard's Bay. The New York, New Haven & Hartford Railway and electric lines connect New Bedford with Fall River, Taunton and Boston; the last-named city is fifty-six miles north. Fairhaven, on the opposite side of the harbor, is connected with New Bedford by three bridges, one of which was constructed at a cost of $1,500,000. Steamboats provide transportation for passengers to Marthas Vineyard, Nantucket and Woods Hole, and between New York City and New Bedford there is freight steamer service throughout the year and passenger service during the summer. The entrance to the harbor is defended by Fort Rodman, on Clark's Point. The population in 1910 was 96,652; the state census of 1915 gave an estimate of 114,694, and a Federal estimate in 1916 gave 118,158. The area of the city exceeds nineteen square miles.

Commerce and Manufacture. For many years New Bedford was one of the most important whaling ports in the world, but with the discovery of oil in Pennsylvania the whaling industry declined and the city turned its attention to manufacture. Its present rank as a cotton-manufacturing center is equal to its former rank as a whaling port, and its high-grade Wamsutta muslin and fabrics woven of silk and cotton have made it famous. Nearly 32,000 people are employed in its fifty cotton mills. Besides cotton goods, New Bedford makes silverware, cut glass, cordage, leather and machinery and it has paint works, lumber mills and oil manufactories. Manufactured products, coal and fish are the principal articles of commerce. Large sums of money have been expended by the Federal government and by the state in improving the harbor and the shipping facilities.

Buildings and Institutions. New Bedford is an attractive city with good streets, elegant residences and fine buildings, among which are the city hall, post office, the third district courthouse of Bristol County, Masonic Temple, the state armory and some handsome bank

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buildings. The city also has a high school, the state textile school, the old Dartmouth Historical Society and one of the finest libraries in the state, containing about 150,000 volumes. One of the greatest collections of books on the whaling industry in the United States may be found in New Bedford.

History. The first settlement was made in 1652, on land purchased from Massasoit, chief of the Wampanoag Indians, and his son Wamsutta, by a company from Plymouth. It was called Bedford, in honor of the family of the Duke of Bedford, and later New Bedford. Until 1787 it was a part of the town of Dartmouth, in 1812 it was incorporated as a town, and in 1849 as a city. New Bedford was the storehouse of captured prizes during the War of Independence; consequently it suffered an attack by an English fleet under General Earl Gray in September, 1778, when seventy ships were burned and the town was almost completely destroyed by fire. Quaker influence has always prevailed here.

NEW'BERN, N. C., an important seaport on the South Atlantic coast, and the county seat of Craven County. It is situated at the head of steamboat navigation on the Neuse River, an inlet of Pamlico Sound, at the point where it receives the waters of the Trent River. Raleigh, the state capital, is about 100 miles northwest and Wilmington is eighty-seven miles southwest. The Norfolk & Southern and the Atlantic Coast Line railways provide transportation, and steamers communicate regularly with New York and other Atlantic seaports. Americans comprise about ninety-five per cent of the population, which in 1910 numbered 9,961; in 1916 it was 10,483 (Federal estimate).

Newbern has a large, safe harbor, the Neuse River being two miles wide at this point. From the city are shipped out large quantities of grain, cotton, lumber, truck-garden products and naval stores. Industry is represented by lumber, planing and gristmills, pickle works, knitting mills, turpentine factories, canning factories and shipyards, and there are big railroad shops, in which about 2,500 people are employed. The fisheries, too, are important. The most notable buildings are the county courthouse, the Federal building, county jail and a county home.

A company of Swiss and Germans under Baron de Graffenreid settled here in 1710 and called the place New Berne, for the city of Berne in Switzerland. It was incorporated as a city in 1723 and the first Provincial Congress met here on August 25, 1774. During the War of Secession it was a strongly-fortified port of the Confederacy, but it was taken by General Burnside on March 14, 1862.

NEW BRIGHTON, PA., a borough in Beaver County, on Beaver River, two miles above its junction with the Ohio. It is twenty-eight miles northwest of Pittsburgh, with which it is connected by the Pittsburgh & Lake Erie Railway. The near-by coal fields and the river with its abundant power make possible numerous manufactories, and the borough is of increasing importance industrially. Pottery, bricks, wire, nails, twine, bath tubs and brass castings are among the articles manufactured. The population in 1910 was 8,329; in 1916 it was 9,277 (Federal estimate).

NEW BRITAIN, CONN., a manufacturing city of Hartford County, is in the central part of the state, ten miles south and west of Hartford. It is on the New York, New Haven & Hartford Railroad and has interurban electric lines. The population in 1910 was 43,916; in 1915 the state census reported 50,612, of which number forty per cent are foreign born, including Russians, Swedes, Italians, Germans, Hungarians and Irish. A Federal estimate in 1916 gave the population as 53,794.

New Britain is known as the "Hardware City," from the importance of its chief manufactures, builders', cabinet and harness hardware. Other important manufactures are cutlery and edge tools, hosiery and knit goods, foundry and machine-shop products and stamped ware. The total annual product exceeds a value of $22,000,000. Agriculture and fruit raising are the industries of the surrounding country.

It is the seat of a state normal school, and among the more prominent buildings are the Federal building, which cost $125,000, the city hall, erected at a cost of $300,000, the Swedish Lutheran Church, Saint Mary's Cathedral, public library (formerly the New Britain Institute), and hospital. Walnut Hill and Smalley Park are attractive playgrounds.

New Britain was settled in 1687. It was first a part of the township of Farmington, then a part of the township of Berlin. The township of New Britain was incorporated in 1850; the city chartered in 1871 and the two consolidated as a city in 1906. It was the birthplace of Elihu Burritt, the "learned blacksmith," and was one of the first cities of the United States to build a subway for telegraph, telephone and electric-light wires.

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NEW BRUNSWICK, *brunz'wik*, a province of Canada, the largest of the three Maritime Provinces. It has an area of 27,985 square miles, of which only seventy-four square miles are water surface. New Brunswick is 6,557 square miles larger than Nova Scotia, and is nearly twelve times as large as Prince Edward Island. Its area is about the same as the combined areas of New Hampshire, Vermont and Massachusetts.

The boundaries of the province are partly natural and partly artificial. On the south and east, except for the narrow Isthmus of Chignecto, which connects the Nova Scotia peninsula with the mainland, it has water boundaries —the Gulf of Saint Lawrence on the east and the Bay of Fundy on the south. Northumberland Strait, an arm of the gulf, divides Prince Edward Island from New Brunswick. On the north is Quebec, a part of the boundary being formed by the Restigouche River and Chaleur Bay. On the west two rivers, the Saint John and the Saint Croix, form part of the international boundary. There the state of Maine lies between New Brunswick and southeastern Quebec. From north to south the greatest length of the province is 230 miles, and from east to west 190 miles.

LOCATION MAP
Showing the size of New Brunswick as compared with entire British North America.

The People. The population of New Brunswick at the census of 1911 was 351,889. This was an average of 12.61 per square mile, as compared with 22.98 per square mile in the neighboring province of Nova Scotia and 1.93 for the Dominion as a whole. The rural population was 252,342, nearly seventy-two per cent of the total. About sixty-five per cent of the population is of British descent, and about 100,000 people, or thirty per cent, are of French descent. Immigration has practically ceased, except from Great Britain and the United States, and less than ten per cent of the present population was born outside the province.

Physical Features. The most noteworthy physical characteristic of New Brunswick is the network of rivers, lakes and bays in all sections. Practically every spot in the province can be reached by water. The headwaters of the principal rivers are very near each other, and comparatively short portages are required between them. Thus in ancient days the Indians made portages between the upper waters of the St. John, the Miramichi, the Restigouche and other rivers, just as hunters and fishermen do now. Only the lower courses of the rivers are important as transportation routes, but the upper stretches play a large part in lumbering.

The surface of New Brunswick is divided into two parts by a ridge or height of land extending from the southwest to the northeast corner. This height forms the watershed separating the eastern from the western rivers. It nowhere rises to a great altitude, the average being from 1,000 to 1,500 feet, with here and there an occasional "monadnock" rising to 2,000 or 2,500 feet. Mount Carleton, the highest point in the province, has an altitude of 2,630 feet. The eastern coast, along the Gulf of Saint Lawrence, is low and sandy, but on the south, along the shores of the Bay of Fundy, is another bold, rocky ridge. Except for these two

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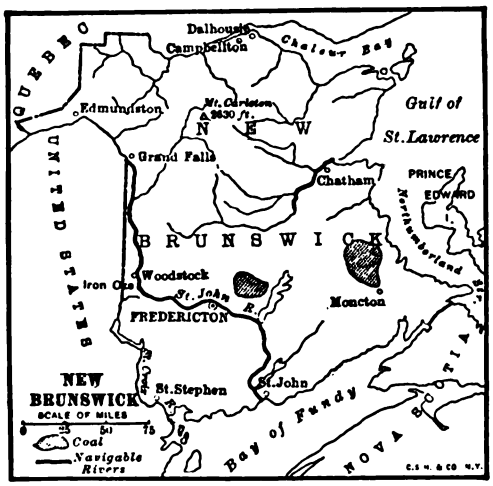
elevated sections, which are extensions of the Appalachian chain in the United States, the surface is a low, rolling plain, cut by many rivers flowing southward or eastward. Nearly the whole of the western half of New Brunswick is drained by the Saint John River.

Animal and Plant Life. The province has always been famous for its hunting. Game of all kinds, both large and small, is plentiful, but is protected by long closed seasons. Large game preserves have been established at the



OUTLINE MAP OF NEW BRUNSWICK

Showing the boundaries, principal rivers, leading cities, coal deposits and the highest point of land.

heads of the Miramichi, Tobique and several other rivers. Moose, caribou and deer are still common, as are wolves, foxes, beavers, martens, skunks, otters, minks, rabbits and squirrels. Geese, ducks, partridges and other game birds are abundant on the lakes and bays, and there are many song birds, including robins, catbirds, orioles, bobolinks, bluebirds and swallows. Hawks, owls and kingfishers are not unusual, and eagles are occasionally seen. The rivers and many small lakes are stocked with salmon, trout, bass and other game fish. The sea fisheries yield principally lobsters, oysters, herring, cod and smelt.

The plant life, like the animal life, is abundant, but includes no species peculiar to New Brunswick. The abundance of game is due in part to the protection of the forests, which still, in spite of fire and the lumberman, cover over half of the province. Black spruce is most widely spread, but is closely pushed by hemlock, cedar, birch, beech, oak and ash. There are many native grasses, flowers and shrubs.

Agriculture. In spite of a few superficial handicaps, agriculture is, and has always been, the leading industry. The prominence of lumbering and the westward trend of population, which have taken so many farmers' sons into the newer provinces, have somewhat obscured the importance of the farm. Yet according to the last census about 46,000 persons, over thirteen per cent of the total population and nearly one-half of the working population, are engaged in agriculture.

The most productive regions in New Brunswick are the alluvial lands along the rivers. The uplands, too, are for the most part fertile, and yield fine crops of hay and oats. Perhaps a quarter of the total area, comprising heath, bogs and swamps, was formerly regarded as waste land, but with proper drainage now produces large crops of hay. Even the "barrens," so called, produce blueberries in abundance, without cultivation.

Hay is the most valuable crop, with an annual average ranging from $7,000,000 to $9,000,000. The potato crop is about 10,000,000 bushels a year, and is worth more than $4,000,000. The average crop of turnips is 3,000,000 bushels, worth about $1,000,000; oats, 6,000,000 bushels, $3,000,000; buckwheat, 1,500,000 bushels, $1,000,000. The value of the field crops naturally varies considerably from year to year, but $20,000,000 is a fair average total.

Hardy fruits, especially apples, are raised extensively in the river valleys, and berries and small fruits are abundant everywhere. These fruits ripen late, and are sold at good prices in the New England markets, where the local supply has already been exhausted. The provincial government maintains about twenty-five model apple orchards in different sections. The raising of live stock, especially sheep and dairy cows, is receiving increasing attention. There are now about 100,000 milch cows and the same number of other cattle, 125,000 sheep, and about 70,000 horses. The production of butter is well over 10,000,000 pounds a year, and of cheese about 1,500,000 pounds.

The newest branch of agriculture is fur farming, which has become important in all three of the Maritime Provinces. Although the industry has proved profitable to those engaged in it, it cannot be said that it is as yet firmly established on a sound business basis. The breeding and raising of foxes and other fur-bearing animals, however, is shown beyond doubt to be both practicable and profitable. See FUR AND FUR TRADE.

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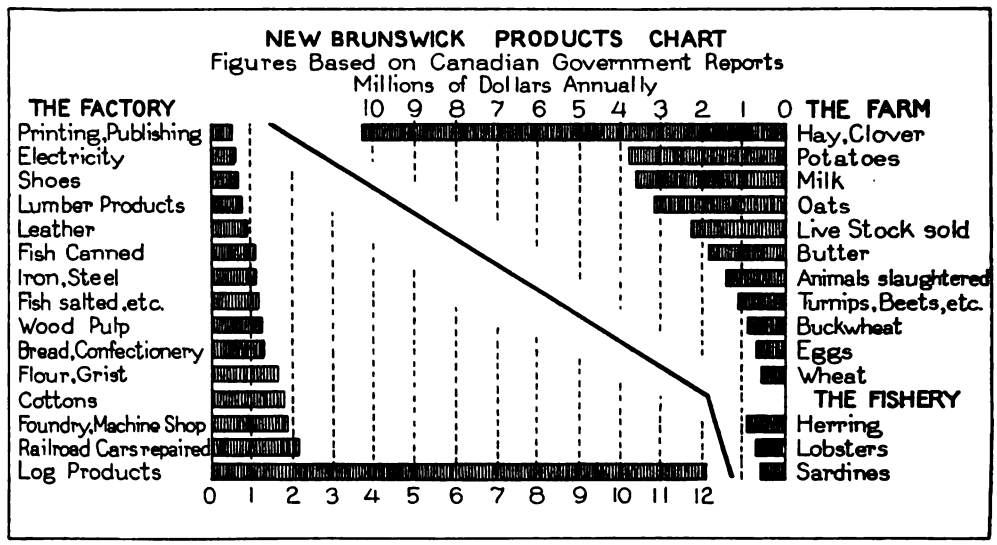
Lumbering. When the first settlers came to New Brunswick practically the whole area was covered with forests, but fires and lumbermen have destroyed from one-third to one-half of the forests. On the shores of the Bay of Fundy most of the trees are firs and spruces, varieties which are also found in the western and northern part of the province. In the northeast are birch, beech, maple, ash and other hardwoods, and elm is common in the river valleys. The abundance of trees, the nearness of the forests to the ports, and the facilities for logging furnished by the many rivers have combined to make lumbering second only to agriculture among the great industries of the province. A river without a lumber mill is practically unknown in New Brunswick. The annual timber cut is worth about $7,000,000, and the value of the lumber manufactured is about double that figure. The province controls the cut of timber on crownlands by issuing timber licenses to the highest bidder. The manufacture of wood pulp, though relatively a small branch, is growing steadily, and in time will undoubtedly be a great industry.

Fisheries. The commercial fisheries, with an annual output of $4,000,000, rank third among the industries. The biggest output on record, that for the fiscal year ending March 31, 1915, was $4,737,145. New Brunswick's catch of fish ranks third among the provinces, but it is only one-half the average for Nova Scotia, which ranks second, and about one-third that for British Columbia, which leads. The value of the catch as landed is about two-thirds that of the market value as given above.

The market value of the sardine catch is over $1,000,000 a year, about one-fourth of the total for the province; this total includes the fresh, salted and canned sardines, and about $400,000 of it is properly credited to manufactures. The second valuable catch in the green state is herring, which represents from one-sixth to one-fifth of the total. Lobsters, smelts, cod, salmon, hake and oysters are next in order.

It is estimated that the capital invested in the New Brunswick fisheries is about $4,000,000. Most of it is in the hands of independent fishermen, but in the lobster and herring fisheries there has been a tendency towards combination. The commercial fisheries, with a few insignificant exceptions, are all sea fisheries. Some trout, salmon, shad and other fish are taken from the rivers and inland lakes for commercial purposes, but the total value of this catch never exceeds $40,000 or $50,000.



Mineral Resources. The mineral wealth of New Brunswick is not as great as that of its neighbor, Nova Scotia. Practically the whole of the triangular section lying southeast of a line drawn from Fredericton northeast to Chaleur Bay—a little more than one-third of the entire province—belongs geologically to the Carboniferous Age. Bituminous coal is known to exist throughout most of this section, but for the most part it is impure or in thin seams. The only important coal areas are indicated on the map of New Brunswick on the preceding

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page. Of the average annual production of minerals in New Brunswick ($1,000,000), coal represents from fifteen to twenty per cent. A strange coal-like substance called albertite (because it was discovered in Albert County) was formerly of importance, but the only known sources of supply are now exhausted or are too small to be of commercial value. Albertite is jet black, soft and brittle, and burns readily. It is undoubtedly related both to coal and to petroleum. It was formerly used in the manufacture of artificial gas and also of oil.

Of the other minerals which are known to exist the most valuable are iron, nickel, manganese, antimony and salt. Gypsum, plumbago, granite, limestone and brick clay are abundant, and freestone, which is in great demand for grindstones and for building, occurs chiefly in the eastern counties along the Gulf of Saint Lawrence. In 1911 natural gas was discovered near Moncton in Albert County, and this field is now one of the three great sources of supply in Canada.

Trade and Manufactures. One industry, lumbering, is dependent to a large degree on the rivers, but most of the commerce and manufactures are the result of railway expansion. New Brunswick now has about 2,000 miles of railway in operation, and is served by the Intercolonial, the National Transcontinental, the Canadian Pacific and a number of local lines. Its long coast line and excellent harbors have also been strong factors in commercial development. Saint John, the chief port, has all of the foreign trade and a considerable part of the coastwise traffic, but some of the latter is shared by Moncton, Chatham, Dalhousie and other ports. The foreign trade of New Brunswick amounts in round numbers to $50,000,000 a year, of which one-third is imports and two-thirds exports.

The chief article of export, which is also the most important among manufactures, is lumber. Log and lumber products constitute slightly more than one-third of the value of all manufactures—about $15,000,000 out of $40,000,000. Wood pulp is a product of ever-increasing importance, and should continue to increase in value, for the supply of spruce is large, if not inexhaustible. Cotton goods, car repairs, preserved fish, wood pulp, iron and steel products, bread and confectionery rank in the order named. New Brunswick has over 1,200 manufacturing establishments, employing at least 25,000 men, with salaries and wages amounting to $10,000,000 a year.

Government. The government of New Brunswick is like that of the other provinces of the Dominion. The chief executive is the lieutenant-governor, who is appointed by the Governor-General in Council for a five-year term. His salary is $9,000 a year. The lieutenant-governor appoints the executive council or cabinet, which is composed of members of the legislative assembly. As in all the provinces the cabinet or ministry is responsible to the assembly and holds office only so long as it commands the confidence of a majority of the members. The ministry is composed of the premier, provincial secretary and treasurer, attorney-general, and the ministers of agriculture, lands and mines, and public works. In actual practice the premier usually holds one of the other portfolios as well as the presidency of the council. The legislative assembly, composed of forty-seven members, is elected for five years, but it may be dissolved sooner by the lieutenant-governor. There was formerly also an upper house, the legislative council, whose fifteen members were appointed for life, but this was abolished in 1892.

COAT OF ARMS

Local government is carried on by county councils, consisting of two councilors elected biennially by each parish (the county is divided into parishes, as in Quebec, not into townships, as in Ontario). Unlike other provinces there is no well-developed municipal system. Cities may be incorporated by special act of the legislature, and then elect their own mayors and aldermen.

The Courts. There are three classes of courts in the province. The local courts are presided over by police magistrates and justices of the peace, whose jurisdiction is limited to cases involving debts not over $80. The county judges, six in number, appointed by the Dominion government, have jurisdiction in suits for debts or damages up to $400, in actions for tort to $200, and in suits for penalties on sheriff's bonds to any amount. The supreme court is composed of seven judges, appointed by the Governor-General, and each of its members may act as a trial judge. This court has

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original jurisdiction in all matters not assigned by law to the special divorce and admiralty courts. The chief justice and two puisne justices sitting together constitute a court of appeal.

Finance. Nearly one-half of the total income of the province comes from the annual subsidy granted by the Dominion government. On the basis of the 1911 census this subsidy amounts to $637,976 a year. Timber licenses are an important source of revenue, and the balance is made up of miscellaneous taxes and fees.

Education. All public schools in New Brunswick are undenominational and free. The schools are under the control of the Board of Education, which is composed of the lieutenant-governor, the members of the executive council or ministry, the chancellor of the University of New Brunswick and the chief superintendent of education, the last appointed by the lieutenant-governor in council. The province grants to each school a sum in proportion to that raised by the school district for the payment of teachers' salaries. The county school fund and local district assessments provide the remainder of the revenue needed.

The provincial normal school (with 400 students) and the provincial university, both at Fredericton, are open to all persons, irrespective of creed. The University of Mount Allison College at Sackville, under Methodist control, was the first college in Canada to grant admission to women on the same conditions as men. At Memramcook is a Roman Catholic college, which ranks among the best in Canada.

History. The history of New Brunswick as a separate colony begins in 1784. Previous to that year it was first a part of Acadia and later of Nova Scotia. The earliest settlement within its borders—that made by Champlain and De Monts in 1604, at the mouth of the Saint Croix River—was soon abandoned, and only traders and adventurers roamed through the wilderness during the French régime. The first English settlement was Maugerville, established in 1762, but the foundation of the province was really laid in 1783, when thousands of United Empire Loyalists emigrated from New England and settled in Canada. So rapidly did the number of immigrants increase that in the next year, 1784, it was organized as a separate colony.

The new colony prospered, and was gradually enlarged by the arrival of immigrants from the British Isles. Although it flourished, New

Research Questions on New Brunswick

(An Outline suitable for New Brunswick will be found with the article "Province.")

How large a proportion of the province is covered with forests? What effect has this on the animal life?

How much more are the fish caught by New Brunswick fishermen worth when they are placed on the market than when they are taken from the water?

How does the salary of the lieutenant-governor of New Brunswick compare with that of the mayor of Chicago? Which has jurisdiction over a larger population?

What are the Maritime Provinces? How does New Brunswick compare with the others in area? In population?

What effect has the opening up of the great western region had on agriculture in New Brunswick?

What proportion of the school teachers' salaries do the school districts have to raise? Where does the rest of the money come from?

Name the water boundaries of the province. The land boundaries. What state in the American Union does this province border upon?

How does the annual potato crop compare in value with the annual catch of fish?

Of what other territories did New Brunswick formerly constitute a part? How did the American Revolution aid in the growth of this region?

How does the density of population per square mile compare with that of Illinois? With that of Ontario?

How does the most important crop compare in value with the three next most important combined?

What does the statement that a part of this province "belongs geologically to the Carboniferous Age" tell you about the mineral possibilities?

How does the annual catch of fish compare with the capital invested in the fishing industry?

What fuel is named for a county in this province? Describe it. For what was it formerly used?

What governmental handicap to development did New Brunswick long contend against? When was a change made?

How does the railway mileage per one hundred square miles of area compare with that of Ontario? Of Alberta? Of Illinois?

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Brunswick soon suffered from irresponsible government, a condition which also prevailed in Nova Scotia and the other provinces. In the long struggle to secure responsible government the leader was Lemuel Allan Wilmot, a biography of whom appears in its alphabetical order in these volumes. Responsible government was finally established in 1848. In 1867 New Brunswick, under the leadership of Sir Samuel Leonard Tilley, became one of the original provinces of the Canadian confederation.

Soon after confederation a movement arose for the abolition of separate Roman Catholic schools. The proposal naturally met strong opposition, but was carried in 1871. In 1875 a compromise was effected by which Roman Catholic children are given special instruction by teachers of their own faith under certain conditions. Since then local issues have played an important part in political campaigns, and the Liberals and Conservatives have alternated in office with more or less regularity. H.V.B.

Consult Perley's *On the Early History of New Brunswick;* Hannay's *History of New Brunswick.*

Related Subjects. The following articles in these volumes may be consulted by the reader interested in New Brunswick:

CITIES AND TOWNS

Campbellton	Moncton
Chatham	Newcastle
Dalhousie	Sackville
Edmundston	Saint John
Fredericton	Saint Stephen
Grand Falls	Woodstock

LEADING PRODUCTS

Apple	Lobster
Fur	Lumber
Hay	Potato
Herring	Sardine

RIVERS

Miramichi	Saint John
Restigouche	

NEW BRUNSWICK, N. J., the county seat of Middlesex County and a manufacturing city, situated north of the geographical center of the state, at the head of navigation of the Raritan River, fifteen miles from Raritan Bay, and at the eastern extremity of the Delaware and Raritan Canal. New York City is thirty miles northeast. Railway transportation is provided by the Pennsylvania and the Raritan River railroads, and electric lines extend from the city in various directions. In 1910 the population was 23,388; it had increased to 25,512 (Federal estimate) in 1916. The area of the city exceeds four square miles.

New Brunswick has a large number of manufacturing houses, among which cigar factories take the lead; these employ about 1,400 people. Rubber works, wall-paper factories, hosiery mills, linoleum factories and automobile plants also have an extensive output. Since there are good shipping facilities by land and water, the city has considerable trade in coal, cotton, raw material for manufacturing purposes and general merchandise.

For its size, New Brunswick offers exceptional educational opportunities. In addition to its public schools, it has Rutgers College, the Theological Seminary of the Dutch Reformed Church in America, the state agricultural and mechanical college, with the state model farms; Saint Agnes Academy; the Voorhees and Gardner A. Sage libraries, and the Carnegie Library. A Federal building, the county record building, a $175,000 bank building and a $175,000 high school are noteworthy structures. The Pennsylvania Railroad passes through the city on a viaduct and enters it by a magnificent stone bridge over the Raritan River. The park reservations of the city include 229 acres.

From the time it was settled in 1681 until 1697, this site was called Prigmore's Swamp. Later, John Inian built a ferry across the river and the name was changed to *Inian's Ferry;* in 1714 the present name was adopted in honor of the German House of Brunswick. The place was granted a royal charter in 1730, was incorporated as a town in 1736 and chartered as a city in 1784. New Brunswick was the scene of considerable activity during the Revolutionary War. The commission form of government was adopted in 1915.

NEW BRUNSWICK, UNIVERSITY OF, an institution for higher education, located at Fredericton, N. B. The University of New Brunswick is the head of the public school system of the province, and is open to students of both sexes who can pass the entrance examinations. The courses of instruction are divided, according to the system of English universities, into ordinary and honor courses. The degrees offered are A. B. (Bachelor of Arts) and B. S. (Bachelor of Science), as well as the usual higher and honorary degrees. The enrolment includes about 200 students. There are about a dozen professors, and the library contains about 15,000 volumes.

The College of New Brunswick, which was founded in 1800, was the predecessor of the present university. After 1805 the college received annual grants from the province, and

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after 1829 also obtained financial assistance from the British government. In 1828 the college received a royal charter, and for the following thirty-one years was known as King's College. It was reorganized in 1859 as the University of New Brunswick. It is interesting to note that since 1845 the university has had no religious tests of any kind except for professors of theology.

NEWBURGH, *nu'berg,* N. Y., a city in Orange County, noted for scenic beauty, commercial progress and historical associations. It is situated five miles above the Highlands of the Hudson River and on the west bank of that stream, in the southeastern part of the state, fifty-seven miles north of New York City, fifteen miles south of Poughkeepsie and ninety-five miles south of Albany, the state capital. Transportation is provided by water and by the West Shore, the Erie and the Ontario & Western railways. The river at this point expands into a bay one and one-fourth miles wide; ferries make frequent trips daily to Beacon, on the opposite bank, and steamers ply between Newburgh and other towns on the river. The population was 27,805 in 1910; the state census of 1915 reported 27,876, and a Federal estimate in 1916, 29,603. The area of the city is nearly four square miles.

Description. Newburgh is a natural park of unusual beauty, overlooking the Hudson River and the Highlands from an elevation of 300 feet. The finest residences and Downing Park occupy the highest sections of the city, from which is obtained a magnificent view of the surrounding country, with the Catskill Mountains to the northwest. Orange Lake Park, six miles distant, is a popular year-round resort, being noted for its ice yachting and skating races in winter. The most notable of the city's buildings are the post office, public library, the $110,000 Y. M. C. A. building, the $115,000 Masonic Temple and the Palatine Hotel. Besides the public schools, there are Mount Saint Mary's, Saint Patrick's and Newburgh academies.

Industries and Trade. The total value of the annual output of the city's numerous and varied industrial plants exceeds $11,000,000; the leading product of these is a leatherette which is extensively used in upholstering by railroads and automobile manufacturers. The largest lawn-mower plant in the United States is located here and the sugar-making machinery of Newburgh is widely known. In addition to these, there are manufactures varying from silks, lace and perfumes to planing-mill products, boilers and heavy machinery. The shipyards are the largest on the Hudson River. Newburgh has an important trade in agricultural and dairy products, the adjacent country being famous for its extensive dairies and for its superior butter. Large quantities of coal, grain and flour are here transferred to barges and coasting vessels.

History. The first settlement at Newburgh was made in 1709 by Germans from the Rhenish Palatinate, who called it the Palatine Parish by Quassaic. In 1752 the name was changed to the Parish of Newburgh for Newburgh, Scotland, by Scotch who had largely replaced the Germans. Newburgh was the headquarters of the American army (the Hasbrouck Mansion), in 1782 to 1783, and it was here that Washington wrote his famous rebuke to Lewis Nicola, who suggested making him king. Here, too, the American army was formally disbanded June 23, 1783, and to commemorate the event the state and Federal governments have erected the Tower of Victory on the grounds. The Hasbrouck Mansion is now owned by the state and is used as a historical museum. Newburgh was incorporated as a village in 1800 and received its city charter in 1865. In 1916 the commission form of government was adopted.

NEW'BURYPORT, Mass., a port of entry and one of the three county seats of Essex County, Salem and Lawrence being the other two. It is situated in the extreme northeastern part of the state and on the Merrimac River, about three miles from the Atlantic Ocean. Boston is thirty-five miles southwest by way of the Boston & Maine Railroad. Interurban lines communicate with cities and towns in all directions. Newburyport was a part of Newbury from the time it was settled in 1635 until 1764, when it was incorporated as a separate town; in 1851 it was chartered as a city. The population was 14,949 in 1910; in 1916 it was estimated at 15,311. The city has an area of fourteen and one-half square miles.

Newburyport has a good harbor for large vessels; coasting schooners bring considerable trade to the city, and it is a distributing point for coal. Formerly shipbuilding was an extensive and important industry, but since its decline attention is chiefly given to the manufacture of cotton fabrics, shoes, boots, silverware, combs, shirts, collars and cuffs. The city has many features of interest, among which are Old South Church, which contains the tomb of George Whitefield, the founder of Calvanistic

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NEW CASTLE, Pa., the county seat of Lawrence County and an important manufacturing city in the west-central part of the state, about twelve miles from the Ohio state line and fifty miles northwest of Pittsburgh. It is situated at the junction of the Shenango and Neshannock rivers and is on the Erie, the Pennsylvania, the Pittsburgh & Lake Erie, the Baltimore & Ohio, the Buffalo, Rochester & Pittsburgh and other railroads. There are interurban lines to neighboring towns and cities. The population, which includes a large number of Welsh, Italian and Polish, was 36,280 in 1910 and 41,133 (Federal estimate) in 1916. The area of the city exceeds nine square miles.

New Castle ranks sixth among the manufacturing cities of the state. Large deposits of bituminous coal, limestone, sandstone, fire clay and iron ore furnish materials for the chief industrial establishments. These include metal-working plants, such as steel and rolling mills, blast furnaces, tin-plate and terneplate mills and car-construction shops; cement works and manufactories of pottery, nails, fire brick, stoves, plows, boilers, radiators and machinery. The knitting mills produce from eight to ten hundred dozen pairs of hosiery per day. The industries of the city employ nearly 17,000 men and the annual value of products averages about $38,385,000. New Castle is surrounded by a fertile agricultural country and has an important trade in farm products and live stock.

The noteworthy buildings include the Federal building, city hall, public library, Y. M. C. A. and Y. W. C. A. buildings, high school, opera house, club buildings and churches. The city has the Almira Home for Aged Women, the Shenango Valley Hospital and the New Castle Hospital. There are several small parks, and a short distance from the city is the noted pleasure resort, Cascade Park.

New Castle was founded in 1812, incorporated as a borough in 1825 and became a city in 1869. The city charter was revised in 1889. A modified commission form of government was adopted in 1913. R.MC K.W.

NEWCASTLE-UPON-TYNE, the great center of the coal regions of Northumberland and Durham, and a county borough of England, situated on the left bank of the River Tyne, 272 miles by rail northwest of London and eight miles inland from the sea. The English system of railways had its origin in this city; to-day its locomotive and engineering works are among the largest in the country. An old bridge (1849), connecting Newcastle with Gateshead, on the opposite bank of the river, was designed and constructed by Robert Stephenson, son of the famous inventor, George Stephenson. Three other bridges at this point span the river, whose waters from Newcastle to the sea are crowded with trading vessels and whose banks are lined with docks and factories. The city boasts one of the largest meat and vegetable markets in the United Kingdom. It ships out great quantities of coal, iron, copper, lead, alkali and machinery, and has prosperous manufactories of stained glass, soda, bleaching powder, vitriol, salt, earthenware, fire brick, gas retorts, fire-clay pipes, grindstones and cement. Steel shipbuilding is carried on extensively. In the city are famous ordnance works owned by Lord Armstrong.

Newcastle dates from the Roman period, and on its site was a fort which helped to guard the great wall of Hadrian. After the Romans withdrew, the settlement was for a time the residence of a colony of monks. About 1080, Robert, eldest son of William the Conqueror, began the erection of a castle on the river bank; from this the present name of the city was derived. The walls of the old town and other traces of its past history have been destroyed for the most part in the modern development of the place. A castle on the site of the one built by Duke Robert is now cared for by the Newcastle Society of Antiquaries. The city is the seat of the medical and science colleges of Durham University. Population in 1911, 266,603.

NEWCOMB, *nu'kum,* Simon (1835-1909), an American astronomer, was born in Wallace, Nova Scotia. He received his early education in his father's school in Nova Scotia, emigrated to the United States at the age of eighteen and began teaching in Maryland. In 1857 he was appointed computer on the *Nautical Almanack* at Cambridge and in 1858 graduated at the Lawrence Scientific School. He was a keen mathematician and a practical and accomplished astronomer and wrote authoritatively also on finance and political economy. He was appointed pro-

SIMON NEWCOMB

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fessor of mathematics in the United States Navy in 1861, and personally supervised the construction of the 26-inch equatorial telescope at the Naval Observatory. From 1894-1901 he was professor of mathematics at Johns Hopkins University. He directed several eclipse expeditions, was secretary of the Transit of Venus Commission in 1871-1874, and in 1882 observed the transit of Venus at the Cape of Good Hope. Becoming director of the *Nautical Almanack* in 1877 he held that post until age compelled his retirement in 1897.

Newcomb's work was fittingly recognized in America and Europe; he was a member of nearly every Imperial and Royal Society of Europe and was the first American after Benjamin Franklin to be made an officer of the Legion of Honor of France. He was president of the American Association for the Advancement of Science (1877), president of the Society for Psychical Research (1885-1886), president of the American Mathematical Society (1897-1898) and vice-president of the National Academy of Sciences from 1883 to 1889. He received numerous prizes and degrees from societies and universities both in America and Europe.

NEW ENGLAND CONFEDERATION, the name of a colonial union formed by Massachusetts, Plymouth, Connecticut and New Haven in 1643, which lasted for forty years. It is of special interest as the first attempt at union among the colonies. The official name was *The United Colonies of New England.* It was organized to secure united action against the Dutch, the Indians and the French. Articles of confederation were carefully drawn up and adopted; among them was a clause providing for the return of fugitive servants, which was probably the origin of later fugitive slave laws and American extradition. Authority was vested in a board of eight commissioners, two from a colony, but each colony had full control of local affairs.

NEWFOUNDLAND, *nu'fund land,* a rugged, fog-swept island lying off the northeastern coast of North America, directly across the entrance to the Gulf of Saint Lawrence, and forming with Labrador a British colony. It lies nearer to Europe than any other part of the North American continent, its most eastern point being only 1,640 miles from Valentia, Ireland. It is separated from Cape Breton Island on the southwest by Cabot Strait and from Labrador on the northwest by Belle Isle Strait.

Physical Features. The island, roughly triangular and covering an area of 42,734 square miles, is about equal in size to the state of Virginia, or twice the size of Nova Scotia. Its steep cliffs and rocky headlands are penetrated by deep fiords and by many large and sheltered bays which are dotted with innumerable rugged islets.

The interior is a rocky table-land, broken by low, parallel mountain ranges crossing the island from northeast to southwest, and by isolated peaks known as *tolts.* Great herds of reindeer roam the straggling forests and barren hills, and the bear, wolf, lynx, marten and beaver lure the trapper into the wildest parts of the interior. The Newfoundland dog (which see) is the only animal peculiar to the island, but it is now found there but rarely. In the valleys there are wide marshes and many lakes and ponds bordered by forests of pine, spruce and fir. The principal streams follow the trend of the mountain ridges. The Exploits River, flowing northeast through a chain of lakes, nearly crosses the island, and the Humber and Gander are other large streams.

The northeast coast, which is washed by the Arctic Current, is cold and damp, and the bays are filled with floating ice and are subject to dense fogs, but the climate of the western shores is more temperate than that of Canada as a whole.

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The People. There is little or no immigration, and the inhabitants of the island have changed but slightly in character from the early English, Scotch and French fisher folk from whom they are descended. The population is almost entirely confined to the Avalon Peninsula on the southeast coast, where the capital and largest city, Saint Johns, is located. Including the 4,016 inhabitants of Labrador, the population of the colony in 1914 was 251,726. The largest religious bodies are the Roman Catholics, Anglicans, Methodists and Salvation Army. The schools are denominational and are controlled by four superintendents, one representing each of these religious bodies, and by inspectors for the Presbyterian and Congregational schools.

LOCATION MAP

Industries. The coast waters swarm with many varieties of fish and to its fisheries the colony owes its very existence. More than one-fourth of the entire population are engaged in the industry. Cod is the most important product, and although the cod fisheries have been prosecuted for centuries, the waters along the coasts of Newfoundland and Labrador still produce a large part of the world's supply. Lobster, herring and salmon are also caught in large quantities, and whaling is an important branch of the fishing industry.

Because for many years little attention was paid to any interest but fishing, the arable river valleys long lay idle and neglected. The government offered a bonus for cleared land in 1891, and since that time agriculture has been gradually increasing in importance. Potatoes, turnips, hay and oats are the chief products of the soil, and sheep, cattle, swine and horses are raised.

Copper is mined extensively and there are valuable deposits of lead, iron, silver, coal, gypsum, marble, granite and building stone. Manufacturing is represented chiefly by the pulp and paper industry. At Grand Falls there are pulp and paper mills which are producing 100 tons of paper and 240 tons of pulp every twenty-four hours.

Communication and Trade. There are over 850 miles of railroad, most of this mileage being owned by the government, and in districts near the coast transportation is good. There is steamship communication with Canada, the United States and Great Britain, and with these countries the colony has considerable trade. The chief exports are dry codfish, pulp and paper, iron ores, tinned lobster, sealskins, herring, salmon and cod oil, seal oil and whale oil. The imports consist principally of foodstuffs, textiles, coal, machinery and hardware.

Government and History. The laws of the colony are made by a Parliament consisting of a legislative council of fifteen members, nominated by the governor in council and holding office for life, and a house of assembly of thirty-six members elected by manhood suffrage. The executive authority is vested in the governor, who is appointed by the Crown, and by a council of nine members who are responsible to the lower house (house of assembly).

Newfoundland, having been discovered in 1497 by John Cabot, is the oldest of Great Britain's colonial possessions. The earliest settlers were Portuguese, Spanish and French fishermen, and when Sir Humphrey Gilbert in 1583 took possession of the island for England and tried to found a British colony, his attempts were frustrated by the French, who remained in control until 1713. By the Treaty of Utrecht (1713), France recognized the sovereignty of England but reserved the exclusive right to the cod fisheries on the west coast and to Miquelon and Saint Pierre islands as stations for fishing fleets.

The development of the colony was retarded by the exclusion of all interests but fishing, and the government was in the hands of the fishing captains until 1832, when it was made representative. The rivalry between the French and English continued to exist until 1904, when France gave up the rights on the west coast in

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return for the Los Islands (West Africa) and a strip of territory in Africa.

In 1905 trouble with the United States arose over the fishing rights, but the controversy was settled by the Hague Tribunal in 1910.

Frequent advances have been made by Canada to induce the island to become a province of the Dominion, and Federation has been a leading political issue in the colony (see CANADA, subtitle *History of Canada*). In the recent economical development of the island Sir Robert Bond, Sir William Whiteway, Sir William Winter and Sir R. G. Reid have been prominent. On January 1, 1917, the colony became prohibition territory. E.B.P.

Consult Willson's *The Truth about Newfoundland, the Tenth Island;* Smith's *The Story of Newfoundland.*

Related Subjects. The reader is referred to the following articles, which will be of interest in connection with a study of Newfoundland:

Cod	Herring
Copper	Lobster
Fish	Paper
Fox	Saint Johns
Grand Banks	

NEWFOUNDLAND DOG, a large, handsome dog, one of the most intelligent of the family. With the exception of the great Saint Bernard of Switzerland, no other dog is so splendidly useful to mankind, for its work in saving people from drowning is as notable as the labor of the noble rescuer of lost travelers in the Alpine snows. The Newfoundland dog was first brought to the attention of Europeans toward the close of the eighteenth century, and they named the animal for the British colony on which it was found. As the original dogs of that region are of different breed, it is supposed that the Newfoundland is a result of the crossing of the native dogs and others introduced from Europe in the sixteenth century and later—the pointer in particular. So highly is the Newfoundland regarded that few if any of the species are left on the island of Newfoundland, but these dogs have been bred in large numbers elsewhere, especially in America and England.

NEWFOUNDLAND DOG

The Newfoundland is a noble appearing animal, with strong, broad shoulders, powerful legs, long tail and massive head. Usually the shaggy coat is black, but a light coat with black markings is by no means uncommon. Some of these dogs have tan markings. A full-grown animal is about twenty-seven inches high. Aided by its powerful chest and limbs and its webbed feet, it swims expertly and it brings to its task of life-saving remarkable intelligence and alertness. The hunter, too, finds the dog a splendid retriever. One of Sir Edwin Landseer's most famous canvases pictures a Newfoundland dog.

NEW GLASGOW, *glas'ko,* a town in Pictou County, Nova Scotia, in the north-central part of the Nova Scotia peninsula, eight and one-half miles south of Northumberland Strait. By the Intercolonial Railway it is sixteen miles south of Pictou, eight and a half miles south of Pictou Landing, forty-two and a half miles northeast of Truro and 104 miles northeast of Halifax. It is on the East River, which is navigable for the small steamers running between Prince Edward Island and the mainland. Population in 1911, 6,383; in 1916, estimated, 9,500.

New Glasgow is one of the most important coal-mining and manufacturing communities in Canada. It has the head offices and main plant of the Nova Scotia Steel & Coal Company and of the Eastern Car Company, which makes all kinds of steel and wooden freight cars. Each of these plants employs over a thousand men. Also important are bridge works and factories for making boilers, mining tools and various kinds of machinery, steel and wire fencing, glass and bricks. In 1915 New Glasgow added a new branch, the manufacture of shells for the Canadian and Allied armies in Europe, to its flourishing industries. The town's preëminence in the manufacture of steel and iron products is due, of course, to its proximity to the rich coal and iron mines of the province.

The town was founded in 1785 and was named for Glasgow, Scotland. It was incorporated in 1875. J.R.

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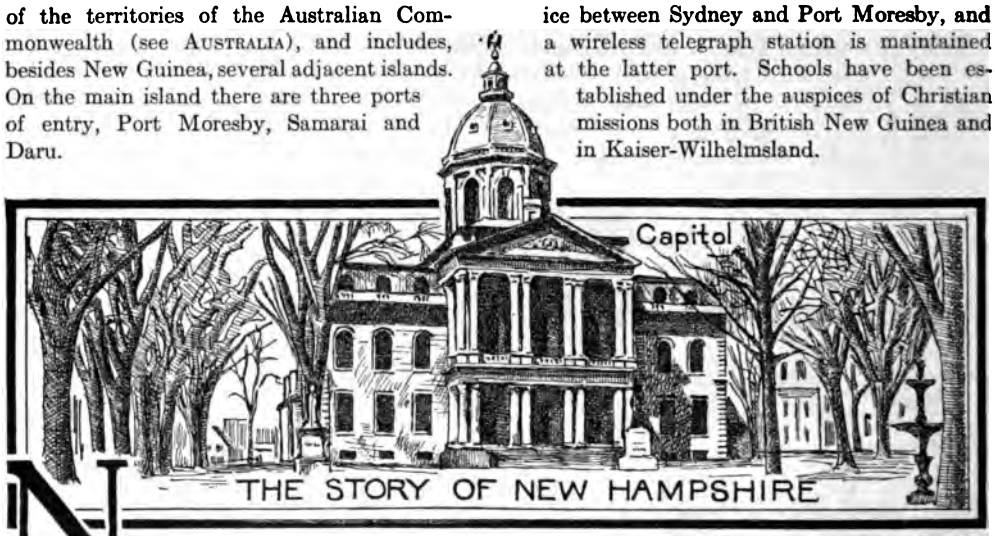
NEW GUINEA, *gin'i,* an island in the Pacific Ocean lying eighty miles north of Australia, from which it is separated by the Torres Strait (see location map, accompanying article AUSTRALIA, page 483). It is the largest island of the Malayan Archipelago and the second largest in the world, ranking next to Greenland (with Australia considered a continent). With a maximum length of 1,490 miles and a maximum width of 430, New Guinea, exclusive of several coast islands belonging to it politically, has an area of 300,274 square miles. It is therefore nearly as large as North and South Dakota, Nebraska and Kansas combined. At the outbreak of the War of the Nations (1914) it belonged to three nations—Great Britain, the Netherlands and Germany.

British New Guinea, which forms the chief part of the territory of Papua, is the southeastern part of the island. It has an area of 87,786 square miles and an estimated population of 252,000. Of the inhabitants, about 250,000 are native Papuans, a branch of the negro race; there are about 1,200 Europeans. Papua is one of the territories of the Australian Commonwealth (see AUSTRALIA), and includes, besides New Guinea, several adjacent islands. On the main island there are three ports of entry, Port Moresby, Samarai and Daru.

Kaiser-Wilhelmsland, the northeastern section of the island, became a German protectorate in 1884. Its area is 70,135 square miles and its estimated population, 531,000. In October, 1914, shortly after the outbreak of the war, this territory was occupied by Australian troops. Dutch New Guinea, with an area of 151,789 square miles and a population of 200,000, occupies the western portion of the island and is a part of the East Indian outpost province of Ternate (see EAST INDIES, DUTCH).

Conspicuous among the animals of New Guinea are the many gayly-colored birds, especially the brilliant birds of paradise (which see). The soil is fertile, and agriculture is receiving considerable attention in the British territory. At the outbreak of the great war over 20,000 acres in that section were planted to cocoanuts, 6,606 acres to rubber, 3,110 to sisal hemp, and smaller areas to coffee, cotton, vanilla, cocoa, tea, tobacco and other tropical plants. Gold is mined here in considerable quantities, and copper fields are beginning to be developed. There is regular steamship service between Sydney and Port Moresby, and a wireless telegraph station is maintained at the latter port. Schools have been established under the auspices of Christian missions both in British New Guinea and in Kaiser-Wilhelmsland.



THE STORY OF NEW HAMPSHIRE

NEW HAMPSHIRE, one of the thirteen original states of the American Union, belonging to the New England group. Its rugged granite mountains, the heights of which are nowhere exceeded in Eastern United States except in the Black and Unaka mountains of North Carolina, have given New Hampshire its popular name, THE GRANITE STATE.

Size and Location. Having an area of 9,341 square miles, of which 311 square miles are water surface, New Hampshire ranks fortieth in size among the states. Its area is about equal to one-third of that of New Brunswick and one-sixth of the state of New York. Cut off from the sea by Maine as far south as Portsmouth Harbor, and by Massachusetts on the southeast, the state has only eighteen miles of seacoast, which is less than that of any of the other Atlantic states. In shape New Hampshire resembles a right triangle, with its sloping side on the west following the Connecticut River, which separates it from Vermont. The right angle is broken by Massachusetts.

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The People. In 1910 the population of New Hampshire numbered 430,572, or 47.7 per square mile, over one and one-half times the average density for the United States. On January 1, 1917, the number of people was estimated to be 443,467. Over one-fourth of the population are foreigners, chiefly French-Canadian, British-Canadian and Irish, and immigration has continued to increase, opportunities for employment being offered to aliens in the numerous factories of the state. Over sixty-two per cent of the inhabitants live in towns or cities; Manchester, with a population of 78,283 (1916), is the largest city and manufacturing center. Other cities with a population over 10,000 are Nashua, Concord, the capital, Dover, Berlin, Portsmouth, Laconia and Keene.

The largest religious body is the Congregationalist, other important denominations being the Baptists, Methodists and Roman Catholics.

Education. Much attention has always been given to education in New Hampshire; the state aims to keep abreast of the times in its educational methods and administration. An organized system has existed since 1647, when the general court of Massachusetts required towns of over fifty inhabitants to maintain schools. Before the nineteenth century the founding of Phillips Exeter, the well-known New England academy for boys, and other similar schools stimulated interest in education and the early development of a good common school system.

Public education is now administered by towns, though there are a few special districts under the state superintendent, who is appointed by the governor. In 1910 the illiteracy in the state was 4.6 per cent, most of which was among the foreigners; the illiteracy among whites of native parentage was only .8 per cent. In 1914 there were 63,991 pupils enrolled in the public schools. Pupils living in towns where there are no high schools are educated at public expense in towns where high schools are maintained. The educational fund is derived from local and state taxes. Normal schools are maintained at Keene and Plymouth. Dartmouth College, founded at Hanover in 1769, from which have been graduated some of the most distinguished men of the United States; the New Hampshire College of Agriculture and Mechanical Arts at Durham; and Saint Anselm's College, a Roman Catholic institution at Manchester, are the only institutions of collegiate rank. Saint Paul's School at Concord is a famous academy for boys.

Charitable and penal institutions under the state board of charities and corrections include: a school for the feeble-minded and a soldiers' home at Tilton; a state sanitarium at Benton; an industrial school at Manchester; an insane asylum and the state prison at Concord. Almshouses and houses of correction are maintained in each county. The blind are systematically cared for and educated.

The Land. New Hampshire is famous for its delightful scenery of forest-covered hills and rough mountains, filled with deep glens, rushing streams, waterfalls and beautiful lakes. The mountains, traversed by many excellent roads, are among the most beautiful and popular pleasure grounds of the East. The only low part of the state is in the southeast, where the land meets the sea in sandy beaches along which there are salt marshes and tidal creeks. Beyond the Merrimac River it rises to broad fields and rolling hills, which become more rugged in the central part of the state, merging into the lofty Presidential and Franconia ranges of the White Mountains, which cover an area of about 1,400 square miles in the north-central region.

The Presidential Range is the highest, many of its summits rising above an elevation of 5,000 feet. The loftiest peak is Mount Washington, with an altitude of 6,279 feet, the highest mountain, next to Mount Mitchell in North Carolina, in the Appalachian system. Mounts Lafayette and Lincoln, over 5,000 feet above the sea, are the highest mountains of the Franconia Range, which is separated from the Presidential Range on the east by the famous Crawford Notch, through which flows the Saco River.

The Franconia mountains are traversed by the Franconia Notch, through which the Pemigewasset River flows. Profile Mountain, the most interesting feature of the Notch, overhangs a deep, romantic glen. Its upper projection, which resembles a human profile, is known as *The Old Man of the Mountains* and was immortalized by Hawthorne in *The Great Stone Face*. Here also is Franconia Flume, a fissure sixty feet deep, into which pours a foaming torrent. Mounts Moosilauke and Monadnock, Sunapee and Kearsarge mountains are isolated peaks of lofty elevation. A number of bald peaks, rising above the tree line and reflecting the sun on their rocky summits, have the appearance of snow-covered mountains and have given to these ranges the name "White Hills," later changed to White Mountains.

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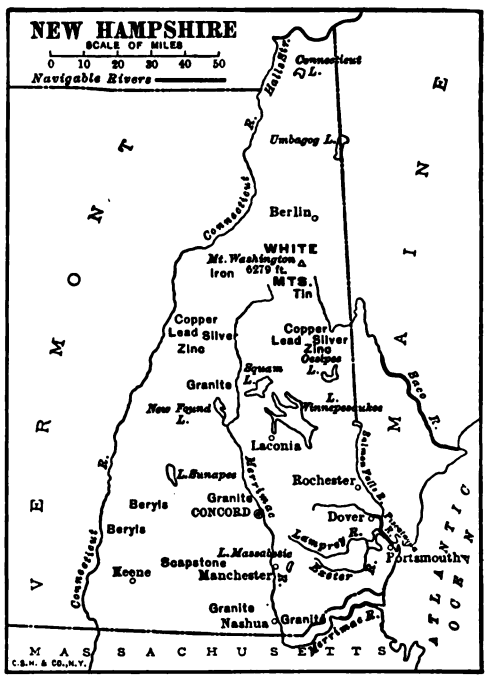
East of the White Mountains, from which they are separated by the valley of the Peabody River, are a number of isolated peaks, the highest of which is Carter Dome, with an altitude of 4,880 feet.

In the north the hills are rounded, the valleys wide and rolling and much of the timberland is cleared and devoted to farms. The only large estuary is at the mouth of the Piscataqua, where Portland Harbor lies half in New Hampshire and half in Maine. Beyond this bay,



OUTLINE MAP OF NEW HAMPSHIRE
Showing boundaries, principal rivers, chief cities, mining and quarrying centers, and the highest point of land in the state.

nine miles from shore, lies a group of bleak rocky islets, the Isles of Shoals.

Rivers and Lakes. The Connecticut, the longest river of New England, rising in Connecticut Lake and forming the boundary between New Hampshire and Vermont, drains the entire western section of the state southward into Long Island Sound. The swift Merrimac, one of the greatest power-yielding streams of the world, rising in the mountains in the central part of the state, drains the south-central section. Its banks are lined with factories and it is said to turn more cotton spindles than any other river of the world. Saco and Androscoggin rivers, rising in the northern mountains, flow south in New Hampshire, then turning east, make their way through Maine to the sea. The Piscataqua, fed by Salmon Falls, flows into the sea in a broad estuary, where, as its name, meaning fishing waters, indicates, are the best fishing grounds of the state.

The swift flow of these rivers is equalized by waters stored in hundreds of beautiful lakes. The largest of these is Lake Winnepesaukee, sixteen miles long and six miles wide, dotted with 264 wooded islands and enclosed by hills and mountains. Squam, New Found, Winnisquam and Ossipee lakes near Winnepesaukee, Connecticut Lake and Diamond Pond in the White Mountains are other lakes of noted beauty.

Climate. New Hampshire has severe winters, the ground being covered with snow and most of the rivers frozen from autumn to spring. Owing to the high elevation, the climate averages cooler than that of Maine. The warmest section is on the lower Merrimac, but here the average winter temperature is 21° F. The annual snowfall in the northern mountains is seven to eight feet. The summers are cool and pleasant. The average temperature for July is 70° F. in the south and 67° F. in the northern part of the state. Rainfall is plentiful and fairly evenly distributed, the annual precipitation averaging forty-five inches.

Agriculture. In general the soil is poor, containing much stony boulder clay and glacial drift. Fertile sections are found in the bottom lands of the Connecticut and other rivers, and farm lands occupy about one-sixth of the total area of the state. Many farms in the sterile sections of the north-central region have been abandoned and sold for country homes, and the roads improved and features of scenery advertised to attract summer colonies.

Live stock and poultry raising, dairying, fruit and truck farming are extensive branches of agriculture. The most important crop is hay and forage; others are potatoes and Indian corn. Apples are the most plentiful of the fruits, and the strawberry the most important small fruit.

Forests. Nearly one-third of the state, comprising the White Mountain region and Coos County, is forest country. Primeval forests still yield red spruce, which is the chief merchantable timber of the state and in the production of which New Hampshire is exceeded only by Maine. The output of spruce is influenced by its increasing use in the manufacture of paper and wood pulp. Much of the virgin growth of white pine has been cut, but New

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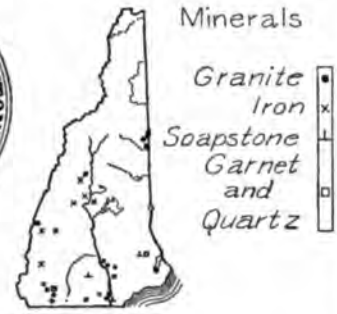
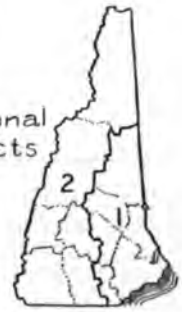
NEW HAMPSHIRE

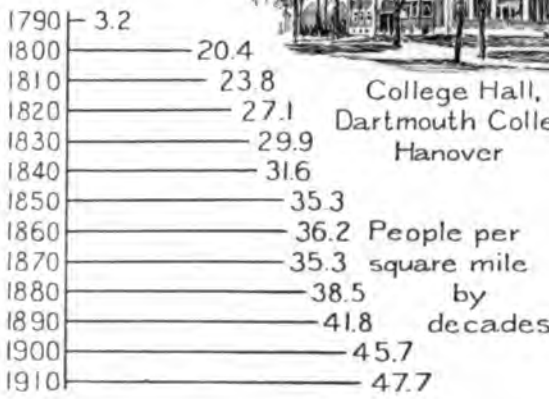




Buildings of Weather Bureau on summit of Mount Washington, in September frost

The Old Man of the Mountain, Franconia Notch

College Hall, Dartmouth College, Hanover



Religions

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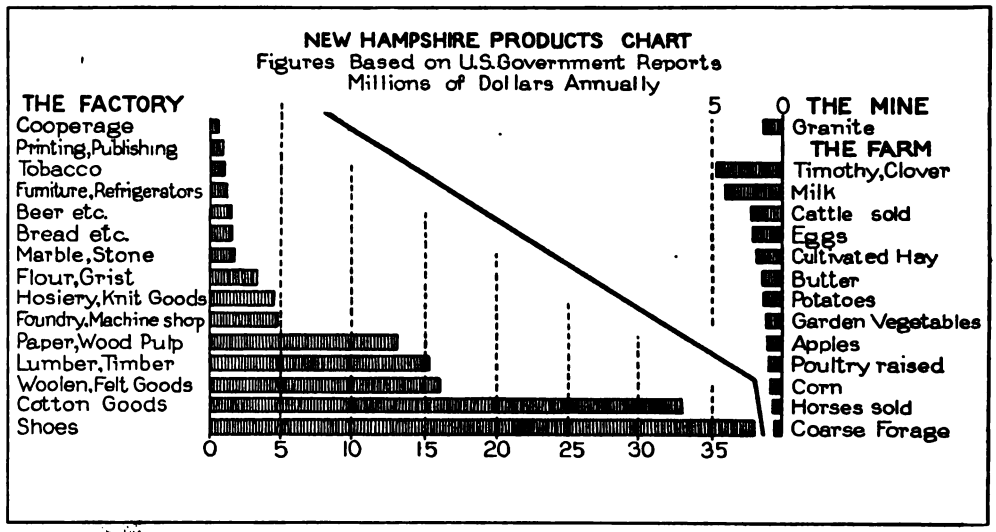

Hampshire ranks fifth among the states in its production. The sugar maple, birch, beech, white oak and cedar are also abundant. The government coöperates with the state in forest-fire protection, and there is an organization of private owners for the same purpose. New Hampshire ranks seventh among the states in its appropriation for the support of the state forest department.

Minerals. Granite and mica are quarried in large quantities and are the chief mineral products of the state. Until 1867 New Hampshire produced all of the mica in the United States, but now North Carolina has a greater output. At the census of 1910, New Hampshire ranked fifth in the production of granite, and has held this place in most of the succeeding years. The principal quarries are in Hillsboro, Merrimack, Cheshire and Carroll counties, and the annual output of the state is valued at one to one and a half million dollars. Scythestones, slate, limestone, spar, occasional gems and mineral waters are other mineral products. Gold, silver, copper, lead and other ores are found only in small, often inaccessible and usually unprofitable, quantities.

Manufactures. New Hampshire's importance as a manufacturing state is due to the great amount of available water power, the proximity of markets, numerous towns and excellent transportation. In 1910, this little state ranked third among the New England states in the output of cotton goods, being surpassed by Massachusetts and Rhode Island; seventh among all the states in the same industry; fourth among the states in the production of boots and shoes; eighth in the manufacture of paper and wood pulp; eighth in woolen, worsted and felt goods; twenty-eighth in the total value of its manufactured products. The leading industries are carried on in the south, along the Merrimac River. Lumber, bakery and foundry products, hosiery and knit goods and flour are also important products. Manchester and Nashua are the most notable manufacturing cities.

Transportation. There are excellent railroad accommodations, especially in the southern part of the state, where every town of importance has access to railroad lines. In 1915, there were 1,221 miles of railroad in the state, the chief lines being the Boston & Maine, Maine Central, and the Grand Trunk. The first cog railroad in the United States was the Mount Washington Railroad, which makes a steep ascent of 3,625 feet in two and three-quarters miles. It is operated during the summer for tourists. There are also over 200 miles of electric railway in the state. A board of three commissioners appointed by the governor and council have the general supervision of railroads.

Government. The present constitution is a revised and amended form of that adopted in 1877, which was practically the fourth constitution of New Hampshire. A convention for its revision may be called every seven years if voted for by two-thirds of the qualified voters.

The *legislative power* is vested in the general court, consisting of a senate of twenty-four members and a house of representatives apportioned according to the population; all towns

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having over 600 inhabitants are entitled to one representative for a full term and one for each additional 1,200 inhabitants. Those districts having a population of less than 600 are entitled to one representative for a proportional part of a term.

The *executive* power is vested in a governor and an advisory council of five members elected for two years. A secretary of state, treasurer and commissary-general are elected by the general court.

The *judiciary* department consists of a supreme and a superior court, each having one chief justice and four associate judges; probate courts and justices of the peace. Practically all judges are appointed by the governor for indefinite terms except the justices of the peace, who are appointed for five years. A juvenile court law is applicable to all under seventeen years of age. Capital punishment is inflicted only upon the request of a jury.

Suffrage is granted male citizens twenty-one years of age and over who are able to read the constitution in English and who have not been convicted of certain crimes. Citizens who were sixty years of age or upward on January 1, 1904, were exempted from this literary qualification. Labor disputes are settled by a state board of arbitration, and child-labor laws, workmen's compensation acts and mothers' pension laws are in effect. In November, 1916, state prohibition was voted, effective in 1918.

History. The New Hampshire coast was explored by Martin Pring, Samuel de Champlain and Captain John Smith. In 1622 the territory between the Merrimac and Kennebec rivers, extending inland sixty miles, was granted to Mason and Gorges as the "Province of Maine." In 1629 the region between the Merrimac and Piscataqua was given to Mason, the founder of New Hampshire, which he named after his native county, Hampshire in England. Fishermen from Massachusetts settled at Little Harbor and Dover Neck, and Exeter was settled by Massachusetts religious refugees. By 1643 all of the settlements had voluntarily joined Massachusetts, and although New Hampshire was declared a royal province in 1679, it was practically governed by Massachusetts until the Revolution.

New Hampshire was conspicuous in its stand against British taxation and furnished more than its share of troops to the Continental armies. Adopting a constitution in January, 1776, it was the first state to form a government wholly independent of England. New

Research Questions on New Hampshire

(An Outline suitable for New Hampshire will be found with the article "State.")

How many of the following states have altitudes exceeding the loftiest in New Hampshire: Vermont; New York; Georgia; Texas; Arkansas; Nebraska?

Of what substance much used in the manufacture of stoves does New Hampshire produce a large amount?

How did the state receive its name?

What physical feature of the state has been celebrated in one of the most famous stories in American literature?

Give three factors which have contributed to the growth of the manufacturing industries of this state.

What stand has New Hampshire taken on the prohibition question?

How many Atlantic states have a longer seacoast?

What river turns more cotton spindles than any other in the world?

What river has a name which indicates one of its chief characteristics?

What is a cog railroad? What distinction has New Hampshire with reference to this kind of railway?

How many states have a larger population? (See list under UNITED STATES.) How many of these more populous states are larger?

Where have most of the immigrants come from?

When was the first system of education organized? Of what colony did New Hampshire form a part at that time?

Why has the state a cooler climate than a neighboring state which lies farther north?

What classes of persons are not allowed to vote?

How does the illiteracy percentage compare with that of New York? How do the illiteracy percentages of the two states for native-born whites compare?

Why have many farms in this state been abandoned? What part of the total area do farm lands occupy?

How large a proportion of the area of the state is covered by the ranges of the White Mountains?

To what comparatively new use has much of New Hampshire's output of spruce lumber been put?

What has the state done to maintain its forests?

How many colonies had a government independent of England earlier than did New Hampshire? How many constitutions has the state had?

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Hampshire adopted the Federal Constitution on June 21, 1788, and as it was the ninth state to ratify it, this action assured its final adoption and the establishment of the United States. A second state constitution was adopted in 1784 and practically rewritten in 1792 and 1877.

From 1856 to 1912 New Hampshire was stanchly Republican, and during the antislavery discussion and War of Secession the state ardently supported the Union. In the early twentieth century, several amendments to the constitution were passed, including taxation and primary reforms and the passage of laws curtailing the great political power of railroads.

In 1912 three more amendments were added providing for the election of officers by a plurality vote, the disqualification of voters convicted of certain crimes, and the changing of the basis of representation from property to population. In April, 1917, the legislature passed a state prohibition act, to become effective May 1, 1918. E.B.P.

Consult McClintock's *History of New Hampshire;* Hale's *New Hampshire.*

Related Subjects. The following articles in these volumes will be of interest in connection with a study of New Hampshire:

CITIES

Berlin	Laconia
Concord	Manchester
Dover	Nashua
Keene	Portsmouth

LEADING PRODUCTS

Boots and Shoes	Mica
Granite	Paper
Lumber	

PHYSICAL FEATURES

Connecticut River	Saco River
Merrimac River	White Mountains

NEW HAVEN, CONN., the first city of the state in population and in manufacturing, and as the seat of Yale University, one of the foremost educational centers in the Union. It lies at the head of New Haven Bay, an inlet of Long Island Sound, eighteen miles northeast of Bridgeport. New York City is seventy-two miles southwest, and Boston is 157 miles northeast, by rail. Six branches of the New York, New Haven & Hartford Railway enter the city from various directions, and electric lines communicate with adjacent towns. There is excellent transportation by water. The population increased from 133,605 in 1910 to 149,685 (Federal estimate) in 1916. Russian Jews and Italians predominate in the foreign element.

Parks and Streets. New Haven is partially encircled by hills which rise into rugged heights from 350 to 400 feet on the east and west, and form a picturesque background for the city. The early settlers planned the streets to cross each other at right angles, thereby forming nine squares, each a mile long, with "The Old Green" as the central square. Around this the people dwelt, and for a time it was their burial ground. Here, too, stood the whipping post, the stock and the pillory. The streets are thickly lined with majestic old elm trees planted more than 100 years ago, and now numbering more than 24,000. Because of these the city has become known locally as *The Elm City.* Though they frequently hide the homes from view, the broad, generous lines upon which the city is built prevent the abundant growth of trees from giving the place a congested appearance. The park reservations cover 1,200 acres, East Rock and West Rock parks being the most noted. The former contains a splendid soldiers' and sailors' monument and the latter has the famous Judges Cave, the hiding place of the regicides, Whalley, Goffe and Dixwell, for whose capture reward was offered by Charles II of England.

Institutions. The campus of Yale University, a world-famous institution of learning, occupies two city blocks which lie directly west of "The Old Green." The buildings and halls of the institution are among the most prominent buildings of the city (see YALE UNIVERSITY). In addition there are the Hopkins Grammar School, a state normal school, Hillhouse High School, the Boardman Manual Training School, the public library (the gift of Mrs. Mary Ives), and the libraries of the New Haven Colony Historical Society and the American Oriental Society. Benevolent institutions include Grace and City hospitals, and two orphan asylums.

Buildings. Noteworthy among the public buildings are the massive $1,500,000 county courthouse, constructed of white marble, the $1,000,000 Taft Hotel, the Second National Bank building and the handsome new Federal building, completed in 1917 at a cost of $1,500,000. Three old churches which face "The Old Green" are buildings of historical interest.

Manufacture and Commerce. New Haven is noted for the variety, as well as for the extent, of its manufactures, among which metal products rank first. The Winchester Repeating Arms Company employs 18,000 people, the New Haven Clock Company has 3,000 employees, and about 5,000 are engaged in making general hardware. The general offices and the large machine shops of the New York, New Haven & Hartford Railway are located here. Through

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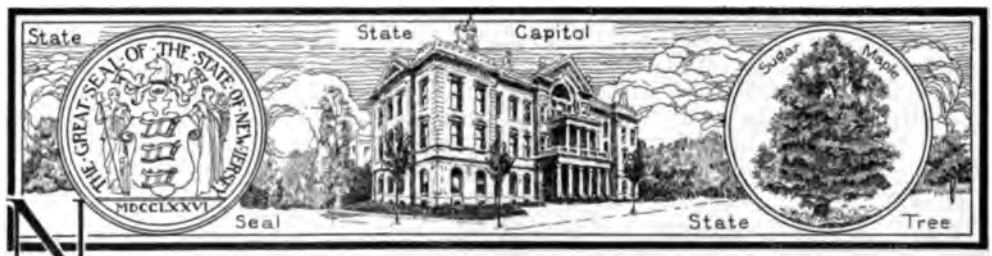
its fine shipping facilities by rail, New Haven has become a distributing point for coal, fertilizer, cement and lumber, all of which are imported by water. The export trade is carried on principally by way of New York. The oyster industry is also important.

History. The site of New Haven was called *Quinnipiac,* the Indian word for *Long River Place,* when a company of Puritans under Theophilus Eaton settled here in 1638. They changed the name to its present one (for Newhaven in England), in 1640. It was a part of a separate colony until 1665, when it was united with Connecticut under the charter of 1662. It was one of the capitals of the state (Hartford being the other) from 1701 until 1874. In 1716 Yale College was removed here from Saybrook, in 1779 the city was captured by the British forces under Tryon and Garth, and in 1784 it was incorporated as a city. From that time its growth was rapid, and greater impetus was given its development by the opening of steamer communications with New York in 1815. New Haven is the burial place of many eminent men, among whom are Noah Webster, Samuel Finley Breese Morse, Lyman Beecher, Eli Whitney and Roger Sherman. F.J.L.

Consult Atwater's *History of the Colony of New Haven.*

NEW HEBRIDES, *heb'ri deez,* a group of islands in the West Pacific Ocean, governed jointly by the British and French. They are included in the Melanesian group, and lie between Australia on the west and the Fiji Islands on the east. To the southwest is New Caledonia (which see), from which the New Hebrides are separated by a deep channel. The main islands of the group are arranged roughly in the form of a great Y. The largest island is 875 square miles in area, and the combined area of the entire chain is 5,100 square miles, a little greater than that of Connecticut. The great bulk of the population of 70,000 consists of natives, who are Melanesians of mixed blood, the prevailing type having black skin, woolly hair, thick lips, sloping forehead and flat nose. Several British and French trading companies are established on the islands, but the European population numbers less than a thousand.

With the exception of a few islands which lie on coral reefs, the New Hebrides are all of volcanic origin, and there are active craters on some of them. The highest elevation, an isolated cone on the island of Lopevi, rises over 4,700 feet above the sea. In the rich soil of the islands, which are watered by numerous streams, tropical plants grow in abundance, including the cocoanut, sandalwood, Kauri pine, breadfruit, sago palm, banana, sugar cane, coffee, maize, arrowroot and several kinds of forest fruits. The chief minerals are copper, iron and nickel. Trade is carried on for the most part with Sydney (New South Wales) and Numea (New Caledonia). The seat of government, Port Vila, is on the island of Efaté. The New Hebrides were named by Captain Cook, who visited them in 1774. See map, with article OCEANIA.



NEW JERSEY, *jur'zi,* a state of the Middle Atlantic group, popularly known as the GARDEN STATE, one of the thirteen original states of the American Union. Although there are only three states having a smaller area, New Jersey is among the foremost in manufacturing. The state is not only of industrial importance, but is also one of beautiful scenery, gardens and flowers, and is widely known for its ocean resorts. It has chosen the sugar-maple tree as its flower emblem.

Size and Location. The state is almost surrounded by water, as all but forty-eight miles of its boundaries are formed by natural waterways; these are the Delaware River and Delaware Bay on the west and south, the Hudson River on the northeast and the Atlantic Ocean on the east. Having an area of 8,224 square miles, of which 710 square miles are water surface, the state is about one-fourth of the size of Maine and ranks forty-fifth in area among the states of the Union.

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The People. This small state, however, ranks eleventh in population, its inhabitants numbering 2,537,167 in 1910. In 1917 the number was estimated to be 2,981,105. The density of the population, averaging about 340 per square mile, is exceeded in only the District of Columbia, Rhode Island and Massachusetts. Almost one-fourth of the inhabitants are of foreign birth, chiefly German, Italian, Russian and Irish, and the negro population numbers 91,273. There are many large cities and towns and over three-fourths of the population is urban. The cities with a population of over 50,000 are Newark, ranking fifteenth among the cities of the United States, Jersey City, the twentieth largest city of the Union, Paterson, Trenton (the capital), Camden, Elizabeth, Hoboken, Bayonne and Passaic, each of which is described under its title (see CITY, page 1393).

Of the religious bodies, the Roman Catholics are the most numerous, their number exceeding that of all of the Protestant bodies combined. The most prominent of these denominations are the Methodist, Presbyterian, Baptist, Episcopal and Dutch Reformed churches. In the early history of New Jersey, Calvinism had a large following among the Scotch, Dutch, English and French Huguenots, and in the western part of the state the Quakers held sway. After the Revolution the Methodist Church greatly increased in membership, but with the coming of the Italians, Germans and Irish in the middle of the nineteenth century, the Roman Catholic Church became predominant.

Education. The present township system of education, established in 1894, is administered by a state board of education, consisting of eight members, the commissioner of education and four assistant commissioners, and by county superintendents. Public schools are supported by the state educational fund, and by state, railroad and local taxes.

There is a compulsory education law, and in 1914 the total school enrolment was 534,511. The illiteracy of the state averages 5.6 per cent, the greatest part of which is among foreign-born whites. Industrial and agricultural instruction have been established in both elementary and high schools, a law passed in 1913 provides for vocational schools in cities and counties. Such schools have been established at Newark, Jersey City, Paterson, Bayonne, Passaic and Atlantic City. Another advanced step in education has been taken by New Jersey in the establishment of separate classes for the education of subnormal pupils.

Normal schools at Trenton, Montclair and Newark, the Newark Technical School, industrial schools at Hoboken and Trenton, an industrial school for the colored at Bordentown and a school for the deaf at Trenton are main-

OUTLINE MAP OF NEW JERSEY
Showing boundaries, principal rivers, chief cities, mineral deposits and the highest point of land in the state.

tained by the state. Of the many private academies for boys, several are famous; these include Peddie Institute at Hightstown; Lawrenceville School at Lawrenceville; Pennington Seminary in Mercer County; Blair Academy at Blairstown; Newark Academy at Newark; Bordentown Military Academy at Bordentown. There are also many private seminaries for girls. The most prominent institutions of higher education are Princeton University at Princeton, ranking among the greatest American universities; Rutgers College at New Brunswick; Stevens Institute of Technology at Hoboken. There are theological institutions at New Brunswick, Princeton, Madison and Newark. Up to 1916 New Jersey had no college for the higher education of women, but in that year funds were being raised for the establishment of a woman's college at New Brunswick to be affiliated with Rutgers College, and to provide training of the same high grade.

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New Jersey has not yet adopted the plan of state supervision of charities. Institutions of charity and correction are controlled by separate boards appointed by the governor. The institutions for the dependent, defective and delinquent include hospitals for the insane at Morris Plains and Trenton; a home for the feeble-minded at Vineland; a home for epileptics at Skillman; a tuberculosis sanitarium at Glen Gardner; soldiers' homes at Kearny and Vineland. Correctional and penal institutions are a home for boys at Jamesburg; a reformatory at Rahway; a home for girls at Ewing; the state prison at Trenton. Prison contract labor is prohibited. Parental schools and juvenile courts are established in several counties. The state allows $200 a year to any blind person studying in an institution of higher education in New Jersey.

The Land. The northwest section of the state is crossed from northeast to southwest by parallel bands of rounded, wooded mountains, the loftiest being the Kittatinny Range rising from the banks of the Delaware. The narrow gorge known as the Delaware Water Gap, where the Delaware flows between forested mountains rising precipitously above the stream, is famous for the beauty of its scenery. The range reaches its highest point near the New York boundary, where High Knob rises 1,799 feet above sea level.

East of the Kittatinny Mountains the state is crossed by the "Highlands," a beautiful region of lofty, green hills, studded with sparkling lakes. These hills merge into the Piedmont plain, a rolling valley broken by ridges and isolated mountains, and falling gradually to the marshy meadows of the Hackensack Valley and the coast. Among the isolated ridges of this plain is the line of forest-crowned cliffs known as the Palisades, rising sheer from the waters of the Hudson, and forming a wall 200 to 550 feet in height.

The gently-rolling, coastal plain comprises the entire southern portion of the state. It is bordered by salt marshes, or meadows, and shallow lagoons enclosed by long, narrow sand beaches, such as Absecon Beach, upon which is built Atlantic City, the greatest municipal seashore resort in the world. Asbury Park, Ocean Grove, Long Branch and Cape May are other famous seaside resorts of the state. The entire coast is ragged and fringed with inlets and bays, the most important harbors being Newark and Raritan bays. Within the coastal plain is the "Pines," a sandy, fir-clad area extending from the famous health resort known as Lakewood to Cape May.

Rivers and Lakes. The western slopes of the Kittatinny Range are drained by the Delaware, but the streams of the greater part of the state flow east to the Atlantic. The largest of the coastal rivers are the Passaic and Hackensack

PHYSICAL MAP
The area in black represents the only parts of New Jersey which would remain above water if the whole state were 100 feet lower.

emptying into Newark Bay, the Raritan flowing into Raritan Bay, the Mullica and Great Egg rivers, flowing into coast lagoons, and the Maurice, draining the southern end of the state into Delaware Bay. These rivers are generally free from rapids and falls, except the Passaic, which drops fifty feet at Paterson, furnishing the vast water power used by the great silk mills of that city.

In the mountains and highlands there are many beautiful lakes, noted as summer resorts. The largest among these are Hopatcong, Greenwood, Macopin, Splitrock, Wawayanda, Green and Budd's.

Climate. The climate of New Jersey is mild, but there is considerable variation between the

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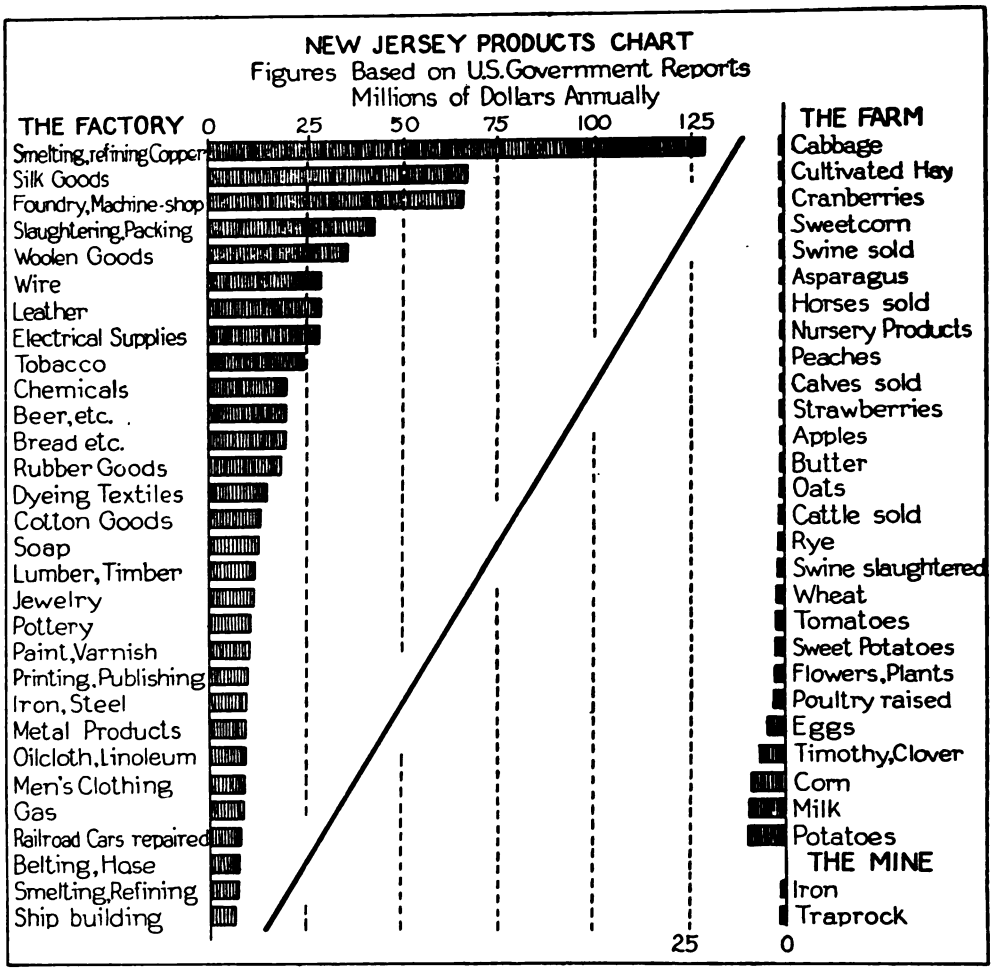

northwestern mountains and the southern and eastern coastal lowlands. The annual temperature of Atlantic City is about 52° F. The mild, sunny winters of the evergreen section called "The Pines" have made it a popular winter resort, Lakewood having one of the most famous winter colonies in the East. The prevailing winds are continental, and the local sea breezes meeting the land winds often cause oppressive humidity along the coast. The annual rainfall averages forty-nine inches, the greater part falling in the mountainous region.

Agriculture. Possessing a mild climate, plentiful rainfall and a diversity of soils, New Jersey has occupied a distinctive position as an agricultural community. In 1910, more than one-half of the land area was in small farms. The western counties are the chief agricultural sections. The most important crops are hay, corn, potatoes, wheat, rye, oats, sweet potatoes and buckwheat. Orchard fruits of all kinds are sold in large quantities to near-by markets, and grapes are grown extensively through the northern section. New Jersey strawberries are of an especially fine variety. Huckleberries cover the mountain slopes and hillsides and blackberries also grow wild throughout the northern section of the state. In the bogs and lowlands of the coastal region, cranberries are successfully grown.

The proximity of large markets has made truck-farming important, and there are large gardens near New York and Philadelphia where quantities of vegetables, watermelons and cantaloupes are grown, the melons of the Hackensack variety rivaling those of Colorado. New Jersey ranks thirty-sixth among the states in the value of crops and is one of the leading states in the Union in the raising of flowers and plants. Dairying is important on the small farms in the highland and mountain regions.

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The state aids agriculture through experiment stations, a board of agriculture and grange and horticultural societies. The forest lands in many sections suffer from neglect and have been decreased by fires.

Fisheries. Extensive fishing grounds in the sheltered bays, shallow coast lagoons and tidal rivers and the proximity of large markets have made the fishing industry important. From the mouth of the Raritan to Sandy Hook and from Barnegat Bay to Cape May there are extensive oyster beds, and those of the Maurice River and Delaware Bay are famous. Clams, weakfish, bluefish, bass, shad and sturgeon are also caught in large quantities. The total annual value of the fisheries product is considerably more than $3,000,000; the capital invested in the industry is about $1,750,000.

Minerals. New Jersey owes its importance as a mineral state to its clay products, which include every variety of brick, tile and pottery produced in the United States. A vast amount of fire and ware clay is found at the mouth of the Raritan, and brick clays are found in thick beds along the Hackensack River. Clays for terra cotta are obtained near Trenton and Palmyra, and Mercer County is the center of the pottery industry. Fire sand, kaolin and feldspar are dug in the Raritan clay district. The zinc production of the New Jersey mines, chiefly Franklin Furnace, Sterling Hill and Mine Hill, is second only to the zinc output of Missouri. The manufacture of Portland cement ranks third among the mineral industries of the state and the production of molding sand and trap rock used in concrete and road building is also important. Granite is quarried at Charlottenburg and Pohuck Mountain, and sandstone, brownstone and slate are produced. The total value of the yearly mineral output of the state is over $37,000,000; of this amount clay products make up more than half, and Portland cement about one-tenth.

Manufactures. The excellent transportation and near-by markets of New York and Philadelphia have developed the great manufacturing industries of New Jersey, which are located chiefly on or near New York harbor or in the vicinity of Philadelphia. In 1915 New Jersey ranked sixth among the manufacturing states of the Union, and it is claimed that in the city of Newark there is made a wider variety of articles than in any other city of the United States. In the smelting and refining of copper and in the production of copper wire, New Jersey leads all of the states. Paterson surpasses all other cities in the United States in the manufacture of silks, and Passaic is noted for its production of woolen goods. Newark is famous for leather, jewelry, oilcloth and hats, and Jersey City for sugar refining, tobacco and soap products. Terra cotta, brick and tile are manufactured in great quantities at Perth Amboy, and Trenton is noted for pottery of all kinds, the state being surpassed only by Pennsylvania in the production of pottery, and ranking third among the states in all clay products. As the home of the Edison plants and other great electrical establishments, the city of Orange is famous. Bayonne has recently been prominent in the manufacture of arms and munitions. Structural steel, iron and glass products are other important manufactures of the state.

Transportation. New Jersey is crossed by all railroads entering New York City from the West, and all lines enter Philadelphia from the East by way of Camden. All New York lines from the West, except the New York Central and the Pennsylvania, have terminals at Jersey City or Hoboken. There are over 2,440 miles of railroad within the state, the chief lines being the Pennsylvania; Central Railroad of New Jersey; Philadelphia & Reading; Delaware, Lackawanna & Western; Erie; New York, Susquehanna & Western; Lehigh Valley; New York Central & Hudson River. There are over 1,370 miles of electric railway track in the state and continuous service is afforded from New York to Philadelphia by way of Jersey City and Camden. Newark, Hoboken and Jersey City have subway service to New York. There are many urban and interurban lines, most of which are controlled by the Public Service Commission.

The water transportation is excellent on the Hudson and Delaware rivers, and the Delaware and Raritan Canal, extending from Bordentown to New Brunswick, and the Morris Canal, crossing the state from Phillipsburg to Jersey City, afford communication between the Delaware River and seaports. Newark has purchased 930 acres of swamp land fronting on Newark Bay for the purpose of improving and extending its harbor. At Bayonne, the Lehigh Valley Railroad is constructing a huge pier to handle ore brought from Chile, which is carried through the Delaware and Raritan Canal to Pennsylvania for the Bethlehem Steel Company. A seashore reclamation project for the redeeming of the swamps and meadows was begun in 1914. Over thirty per cent of the state roads are paved.

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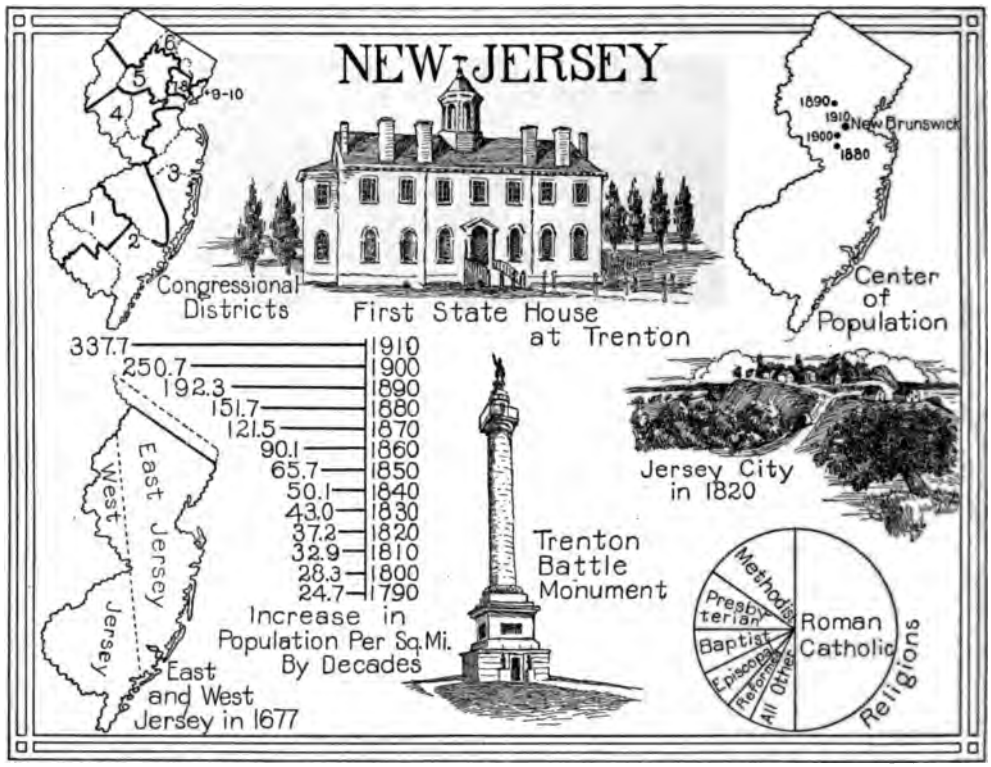

Government and History

The Government. The present and second constitution of New Jersey was adopted in 1844 and amended in 1875 and 1897. Amendments may be proposed in the senate or general assembly and must be adopted by two successive legislatures and by the people. They may not be submitted to popular vote oftener than once in five years. The question of woman suffrage was voted upon and defeated in 1915. All male citizens of the state residing one year and five months in the county in which elections are held have the right to vote. There are direct-primary elections for the President and all state officers.

The *legislative department* consists of a senate of twenty-one members, one from each county elected every three years, and a general assembly of sixty members elected each year and apportioned according to population. The legislature meets annually.

The *executive power* is vested in a governor, elected by the people for three years. A treasurer and comptroller are appointed by the legislature, and the secretary of state, attorney-general, prosecutors of pleas, clerks of the supreme and chancery courts and various commissioners, including the superintendent of public instruction, are appointed by the governor. The governor may not succeed himself.

The *judicial department* is unusually complicated. The highest court is the court of errors and appeals, consisting of the chancellor and justices of the supreme court and six other judges, appointed for six years. Other courts are a court of chancery composed of the chancellor and eight vice-chancellors having terms of seven years; a court for the trial of impeachments; a prerogative court; a supreme court; circuit courts; inferior courts. The supreme court consists of a chief justice and eight associate justices appointed for eight years.

Local government is by counties, cities, townships and boroughs. Cities and towns are required to have local boards of health and may adopt the commission form of government. Child labor laws, employers' liability laws and antitrust acts have been passed. There are stringent laws regulating liquor traffic, but in 1915 municipalities were given the right to vote on the liquor question.

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RESEARCH QUESTIONS ON NEW JERSEY

(An Outline suitable for New Jersey will be found with the article "State.")

What characteristic won for this state its popular name? What historical event is commemorated in its proper name?

Name three places which give this state the right to the title of the "Playground of America."

How many states of the Union are larger? How many of these have a larger population?

How extensive is the land boundary of the state? By what state is this land boundary formed?

If Illinois were as densely populated as is New Jersey, how many inhabitants would it have? Answer the same question for New York.

How many cities are there in the state which have a population as large as or larger than that of El Paso, Tex.?

In a gathering of one thousand people, who were representatives of all classes of the inhabitants, how many would be found who could not read or write?

How does the state care for the education of its blind?

Describe the Delaware Water Gap. How was it formed?

How many hills as lofty as New Jersey's greatest height would it take to reach the highest altitude of New Hampshire? Of Colorado?

What are the Palisades? In what other state are they to be found?

In what direction do most of the rivers flow? What is the chief power-producing river? What product do we owe to its power?

Explain the excess of moisture which sometimes is to be found in the coastal regions.

Why is the production of garden vegetables and small fruits so profitable in this state? What valuable products are obtained from apparently waste land in bogs and mountains?

What does the state do to help the farmer?

What very important manufacturing industries are based on the mineral production of the state?

How many states have more extensive manufactures? What distinction has Newark as an industrial city? In what industrial enterprises is New Jersey unsurpassed by any state?

Mention some very important things which the country receives from the industrial establishments of Orange.

Why does the state have such excellent transportation facilities? What is the railroad mileage to one hundred square miles of area?

How many constitutions has the state had? When was the present one adopted?

What legislation shows the progressive character of the state?

Who compared New Jersey to a "cider barrel tapped at both ends," and what did he mean by the comparison?

What educational institutions have existed in the state since before the Revolutionary War?

In what aspect of the treatment of the Indians was New Jersey a pioneer?

What part did the state play in the Revolution?

What was the "New Jersey Plan," and how did the state show its patriotism when this was rejected?

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Settlement and Colonial Government. When the first settlement of white men in New Jersey was made by the Dutch in 1617, the territory was occupied by the Lenni-Lennape tribe of Algonquian Indians. Through the discovery and exploration of the Delaware River by Cornelius Mey, for whom Cape May was named, Holland claimed the territory. Farmers and traders from New Amsterdam settled in Hudson and Bergen counties and the influence of the Dutch Church and speech was deeply impressed upon the northeast section of the state. Groups of Swedes settled in the Delaware Valley near Philadelphia, but they submitted to the domination of the Dutch, who controlled the colony until 1664, when the territory was conquered by the English and granted to Lord Berkeley and Sir George Carteret. In recognition of Carteret's defense of the Island of Jersey, the grant was called New Jersey. A liberal government was established and many immigrants from New England settled in the colony. Carteret assumed control of the eastern section, or "East Jersey," and Berkeley disposed of his interests in the west to a company of Friends, who controlled "West Jersey" until both it and East Jersey passed under the control of the boards of proprietors.

In 1702 the Jerseys were reunited in a crown colony and the usual colonial quarrels between the people and the royal officers continued until independence was declared. The growth of New York and Philadelphia attracted many of the New Jersey colonists to those cities, and gave rise to Banjamin Franklin's famous remark that New Jersey was like a cider barrel tapped at both ends. Before the Revolution, Huguenots, Scotch and Irish had settled in the central and western parts of the colony, ferries and post roads had been built, Princeton University and Rutgers College had been founded and the first Indian reservation in America had been established in 1758 in Burlington County.

Independence and Statehood. The Revolution found the colony divided in sentiment, and a large number remaining loyal to England joined the Tory raiders known in the colony as the "Pine Robbers." On July 2, 1776, New Jersey issued a declaration of independence. During the Revolution, nearly one hundred battles were fought within the state, prominent among them being the battles of Trenton, Princeton, Red Bank, Monmouth, Paulus Hook and the engagements around Elizabeth and Newark. Washington's "retreat across the Jerseys" and winter occupation of Morristown are other noted events of the war. The state contributed over ten thousand men besides its militia to the Continental army, and its losses were especially severe.

In the Constitutional Convention, the New Jersey representatives offered the "New Jersey Plan," recommending a Union with little authority over the states, but they unanimously adopted the Federal Constitution on December 18, 1787. In the early nineteenth century, New Jersey was the center of the political struggle between partisans of the Federalist leader, Alexander Hamilton, and Aaron Burr, the advocate of state sovereignty, which culminated in the duel fought at Weehawken in which Hamilton was killed. During the War of 1812, the necessity for the overland transportation of troops led to the granting of the first railroad charter in the United States, and the Camden and Amboy Railroad and the Delaware and Raritan Ship Canal were constructed.

In the slavery struggle the state was generally Northern in sentiment and supported the Union army with its full quota of troops. New Jersey's greatest period of prosperity followed the war. Its cities grew with unprecedented rapidity, manufactures increased in importance and agricultural interests in the southern section of the state were developed. The chief issues in state politics have been those connected with taxation, the tariff and the control of corporations. In 1906 the great political power of the railroad corporations was broken.

The state has generally been Republican in national politics, but recently has had several Democratic governors and legislatures. In 1910, Woodrow Wilson, then president of Princeton University, was elected governor, and a Democratic majority was elected to the legislature. The administration of Governor Wilson was notable for many political reforms. In the Presidential election of 1912, Wilson carried the state by a large majority, and in 1916 the Republican candidate, Hughes, won the state. The Democratic legislature of 1913 passed measures advocated by President Wilson reforming jury selection. E.B.P.

Consult Lee's *New Jersey as a Colony and as a State;* Stockton's *Stories of New Jersey.*

Related Subjects. The following articles in these volumes will be of interest in connection with a study of New Jersey:

CITIES

Asbury Park	Bloomfield
Atlantic City	Bridgeton
Bayonne	Camden

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East Orange	Montclair
Elizabeth	Morristown
Englewood	Newark
Garfield	New Brunswick
Gloucester City	Orange
Hackensack	Passaic
Harrison	Paterson
Hoboken	Perth Amboy
Irvington	Phillipsburg
Jersey City	Plainfield
Kearny	Rahway
Long Branch	Trenton
Millville	

HISTORY

Monmouth, Battle of	Revolutionary War in America
Princeton, Battle of	Trenton, Battle of

LEADING PRODUCTS

Corn	Potato
Hay	Pottery
Muskmelon	Silk
Oyster	Strawberry

PHYSICAL FEATURES

Delaware	Raritan
Delaware Water Gap	Sandy Hook
Palisades	

NEW LISKEARD, *lis'kard,* a town in Ontario, in the Timiskaming district, at the head of Lake Timiskaming and on the Timiskaming & Northern Ontario Railway. It is five miles north of Haileybury and ten miles north of Cobalt. Steamers run on the lake between New Liskeard and other points, and connect by a short line with the Canadian Pacific Railway at Mattawa. An electric railway runs to Haileybury. New Liskeard is important for its large sawmills, which are its largest industrial establishments, but it also has a gristmill and other manufacturing plants. The electric light and waterworks systems are owned by the town. Population in 1911, 2,108; in 1916, estimated, 4,000.

NEW LONDON, CONN., a city on the west bank of the Thames River, about three miles from the Atlantic Ocean. It is in the southeastern part of the state and is one of the two county seats of New London County, thirteen miles south of Norwich, the other county seat, fifty-one miles east of New Haven, and 124 miles northeast of New York City. The population, which includes a number of Italians and Poles, was 19,659 in 1910 and 20,985 (Federal estimate) in 1916.

The harbor is one of the best on the Atlantic seaboard. A state appropriation of $1,000,000 has provided for wharves and docks (under construction in 1917 for transatlantic steamships. There is regular steamer service to New York and other ports. The city is on the New York, New Haven & Hartford Railroad, between New York and Boston, and is the terminus of the Central Vermont road. There are interurban lines to New Haven, Norwich and other cities. A great railroad drawbridge spans the Thames between New London and Groton Heights. At this place is Fort Griswold, an old fort of the War of Independence, and a United States naval station.

Buildings and Parks. The interesting features of the city include a Federal building; a customhouse built many years ago; the county courthouse, built in 1784; a public library; the New London County Historical Society and Library; two memorial hospitals; Hotel Griswold; the Hempstead House, one of the oldest houses in the state; the Old Town Mill, built about 1645 and still running, and the little schoolhouse where Nathan Hale once taught. There are two endowed high schools, one for boys and one for girls, and an endowed manual training and industrial school. Ocean Beach, with municipal bathhouses, Riverside, Williams, Memorial and other parks are attractive places. The city contains the Woman's College of Connecticut and the School of Instruction for the United States Revenue Cutter Service. Each year the Yale-Harvard boat race occurs on the Thames River, an event which attracts thousands of spectators.

Industry. Manufacturing is the principal industry of the city. There are large silk mills producing embroidery and spool silk, wash silks and dress silks of every kind, and satin linings. The annual output of one mill is valued at $2,500,000. Other important manufactures include bed quilts and blankets, cotton gins and printing presses, gear-cutting and centering machines, hot-water and steam-heating apparatus, and brass and copper tubes. There are shipbuilding and repair yards. One of the best-known wrecking and salvage firms on the Atlantic coast keeps in close touch with marine disaster by a wireless tower.

History. New London was founded in 1646 by John Winthrop, the younger. It was first known by the Indian name of Nameaug, and the river was known as the Monhegin. Both names were changed in 1658 in honor of London and the Thames in England. Before the War of Independence New London was the center of an important whaling industry. In the fall of 1781, a British force commanded by Benedict Arnold destroyed the city and wharves, and at Fort Griswold executed eighty-four American soldiers, after a number of them had

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surrendered. The place of the massacre is marked by Battle Monument. New London became a city in 1784. J.H.

Consult Caulkins' *History of New London.*

NEWMAN, JOHN HENRY (1801-1890), a notable English cardinal of the Roman Catholic Church, one of the foremost figures in the religious life of his time, but best remembered by all the world as the author of the great church hymn, *Lead, Kindly Light.*

CARDINAL NEWMAN
In giving *Lead, Kindly Light* to the Christian world he made his name imperishable.

He was born in London, studied at Trinity College, Oxford, and in 1822 was elected a fellow of Oriel College. From his childhood he had been deeply interested in religious matters, and in 1816 had experienced a definite conversion; and the natural thing was for him to enter the ministry of the Church of England. In 1824, therefore, he was ordained, becoming curate of Saint Clement's, Oxford. Four years later he was made vicar of Saint Mary's, Oxford, and in that position exercised great influence by reason of his masterly sermons. Originally a supporter of the evangelical, or Low Church, party, he gradually changed his views until, in 1830, he definitely broke with that branch and stood as an acknowledged High Churchman.

Became a Roman Catholic. In the "Oxford Movement" (which see) he was the recognized leader, about a third of the *Tracts for the Times* being from his pen; but, meanwhile, he had begun to doubt the position of the English Church, and to feel far less hostile toward Roman Catholicism. Convinced finally that the Roman Church was the true one, he resigned in 1843 from Saint Mary's, left Oxford, and two years later was admitted into the Roman Catholic Church. In 1846 he went to Rome and was ordained a priest and on his return to England settled near Birmingham, where he established the Congregation of the Oratory. Most of the rest of his life was spent in Birmingham, though from 1854 to 1858 he was rector to the Catholic University at Dublin. Through all these years he was constantly occupied with literary work, producing his famous *Apologia pro Vita Sua* in 1864 as a result of a controversy with Charles Kingsley. His other works include *Essay in Aid of a Grammar of Assent* and some beautiful verse, of which the *Dream of Gerontius* ranks highest. His best-known single poem is *Lead, Kindly Light,* which has been given added popularity by the exquisite music written for it. The words are as follows:

Lead, kindly light, amid the encircling gloom,
Lead thou me on;
The night is dark, and I am far from home;
Lead thou me on;
Keep thou my feet; I do not ask to see
The distant scene; one step enough for me.

I was not ever thus, nor prayed that thou
Shouldst lead me on;
I loved to choose and see my path, but now
Lead thou me on;
I loved the garish day, and, spite of fears,
Pride ruled my will: remember not past years.

So long thy power hath blessed me, sure it still
Will lead me on
O'er moor and fen; o'er crag and torrent, till
The night is gone,
And with the morn those angel faces smile
Which I have loved long since, and lost the while.

Newman was created a cardinal in 1879 by Pope Leo XIII, but was permitted to live in England. His service to the Roman Catholic Church has been great, for he had dissipated many of the persistent prejudices against it. Men of all faiths admired and reverenced him, and the spiritual quality found in his works, no less than their delightful, elevated style, make them of continued interest to readers who are not especially concerned over the subjects which he discussed. A.MC C.

Consult Sarolea's *Cardinal Newman and His Influence on Religious Life and Thought;* Barry's *Newman.*

NEWMARKET, a town in Ontario, in York County, on the Holland River and the Grand Trunk Railway, thirty-four miles northwest of Toronto. It is a commercial center, and also has some manufacturing interests, among its products being flour, lumber, woodenware and canned goods. Population in 1911, 2,996; in 1916, estimated, 3,400.

NEW MECKLENBURG, an island in the Bismarck Archipelago, the second in size of the islands which comprise that group. A part of the German protectorate since 1885, it has been since shortly after the outbreak of the War of the Nations under British control. What will be its fate after the conclusion of peace it is impossible to conjecture.

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NEW MEXICO, one of the rich mining states of the plateau at the south end of the Rocky Mountains, a state of the Southwestern group, and, with the exception of Arizona, the youngest of the United States.

Size and Location. But for the L-shaped section in the southwest corner of the state, west of the Rio Grande, New Mexico is almost a perfect square, lying on the Mexican frontier between Arizona and Texas. Only three states of the Union, Texas, California and Montana, are larger than New Mexico, which has an area of 122,634 square miles, of which 131 square miles are water surface. The state is less than half the size of Texas and ninety-eight times the area of Rhode Island.

The People. Although New Mexico ranks fourth in size among the states, there were, in 1910, only four states with fewer inhabitants. The population was then 327,301, being less than that of the District of Columbia, and averaging only 2.7 to the square mile. On January 1, 1917, the estimated population was 416,966. The inhabitants are of three classes, the English-speaking class, known as "Americans;" the Spanish-Americans, called "Mexicans," and the Indians. The inhabitants of Spanish descent still keep their racial peculiarities and language and the majority of them live in low adobe huts built around a court. Many of them have intermarried with the Indians, creating a class known as "Mestizos." There are 22,000 Navaho, Apache and Pueblo Indians living in the state reservations, Oklahoma and Arizona being the only states having a larger Indian population. The Pueblos live in adobe or stone houses, are usually self-supporting and have been converted to Christianity. The terraced architecture of their many-storied, communal dwellings is remarkable and shows a fairly-advanced state of civilization.

The proportion of Spanish-American and Indian inhabitants is steadily decreasing, and about one-tenth of these people now use the English language. The urban population is small and the only city having over 10,000 inhabitants is Albuquerque. The other principal cities are Santa Fe, the capital, and Las Vegas, in the center of the stock-raising district, important for its shipments of wool.

Owing to the large population of Mexican and Spanish origin, over three-fifths of the inhabitants are members of the Roman Catholic Church. The largest Protestant bodies are the Methodist, Presbyterian and Baptist denominations.

Education. The educational problem is unusually difficult in this state because of its widely scattered and mixed population. When New Mexico became a territory in 1848, there were 90,000 inhabitants who did not speak the English language. A school system was not organized for fifty years, the first school law being passed in 1891. Public education is now being rapidly extended, and the illiteracy, which in 1910 was 20.2 per cent, is decreasing. Elementary education is free, and a compulsory-education law has been passed, applying to all children between seven and fourteen years of age. The use of the English language is enforced in public schools.

Industrial education is supervised by a state director, and other public schools are administered by the state superintendent and local boards of education. Schools are supported by a state fund and taxes levied in each county, district and municipality. Normal colleges are maintained at Las Vegas and Silver City, and state institutions of higher education are the University of New Mexico at Albuquerque, a school of mines at Socorro and a college of agriculture and mechanical arts at Mesilla Park. There are twenty-six Indian schools maintained by the United States government, a military institute at Roswell and a number of missions and church schools.

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State institutions of charity and correction are an asylum for the blind at Alamogordo; an insane hospital at Las Vegas; a reform school at Springer; a miners' hospital at Raton; the penitentiary at Santa Fe. These institutions are controlled by separate boards of directors. In 1915 a law was passed making the education of blind children compulsory.

The Land. New Mexico is a vast, elevated plain, sloping gradually south and southeast,

OUTLINE MAP OF NEW MEXICO
Showing the boundaries, principal rivers, chief cities, location of mineral deposits, coal and gas areas and the highest point of land in the state.

and broken by steep, rocky mountains and mesas. A level, arid section known as the Llano Estacado, or Staked Plain, lies in the southeast. It is separated from the foothills of the Front Range of the Rocky Mountains by the valley of the Pecos River, the only part of the state having an elevation of less than 3,000 feet. Near the center the northern boundary of New Mexico is penetrated by the Rocky Mountains, and the whole northern part is generally mountainous. There are very lofty peaks in this section, among them being Truchas, rising 13,275 feet above the sea, and Cerro Blanco, Taos, Costilla, Baldy, Lake and Mora peaks, all having an altitude of over 12,000 feet. Between the isolated mesas and groups of bare mountains of the Front Range, lie the grassy plains, or basins, called "bolsons" (purses) by the Spaniards.

The Rio Grande Valley crosses the state from north to south between the central mountains and the lofty plateau forming the Continental Divide. The table-land, scarred by deep valleys and studded with the high peaks of the parallel ranges of the Southern Rockies, extends across the state in a southwesterly direction. In the southern part of the state, covering an area of 300 square miles, there is a great basin of white sands in which many kinds of white reptiles and insects are found, this being a most interesting example of protective coloration. This is also the region of "alkali flats," lava beds and arid valleys where grow only the sagebrush, giant cactus and Spanish bayonet.

Rivers and Lakes. For a region of such scanty rainfall, rivers are numerous, and New Mexico has more streams than any other mining state of the Union. The small section of the state west of the Continental Divide is drained toward the Pacific by the San Juan, Rio Puerco, San Francisco, Little Colorado and Gila rivers. The Rio Grande, flowing the length of the state, and its tributary, the Rio Pecos, which meets it in Texas, are New Mexico's largest rivers, and drain the central section. Both of these rivers cut their way through deep canyons in the northern mountains but become sluggish in the southern plains. During the flood season, the Rio Grande usually inundates the lowlands and is often called the "Nile of New Mexico." It is fed by many tributaries rising in the Divide, the largest of these being the Chama and Jemez rivers. In the northeast corner of the state, the Canadian flows through rocky gorges and canyons, and extends into Oklahoma, where it joins the Arkansas River. There are many small streams which are lost in the sands. The waters of the temporary lakes, formed by melting snows, evaporate during the summer, leaving barren mud beds incrusted with salt.

Climate. New Mexico has only about twenty-three cloudy or rainy days a year. There are no extremes of heat or cold, but owing to the absorption and radiation of the sun's heat by the great sandy areas, there is a wide daily range in temperature. The average winter temperature is 35° F. and the mean summer temperature 71° F. The annual rainfall ranges from six inches in the southwestern valleys to thirty inches in the northern mountains. The snow accumulates to great depths on the mountain peaks and forms a steady source of water

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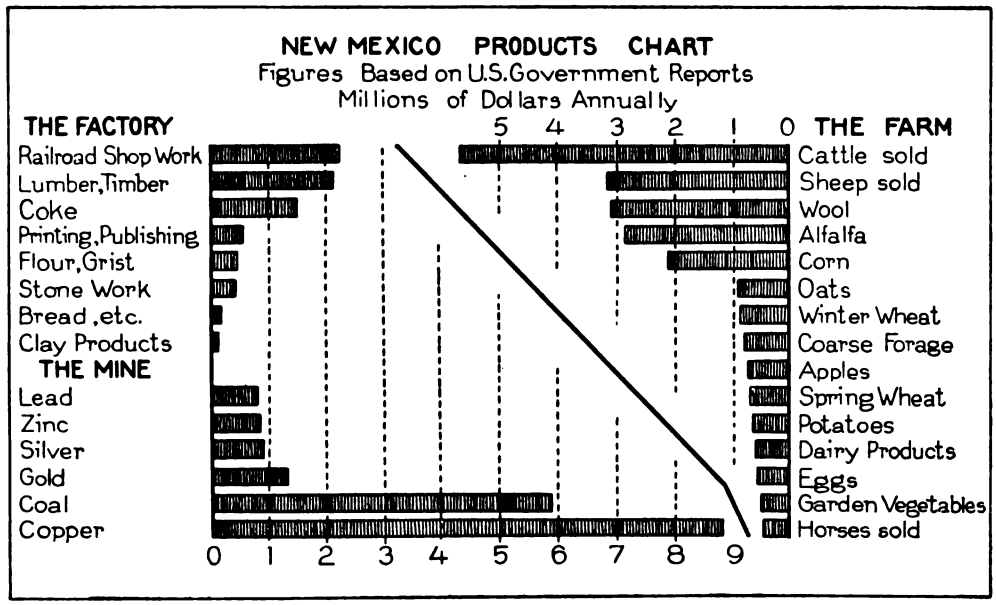

supply for many of the rivers. There are usually two snows a year in the valleys, and these quickly disappear. Because of its mild, dry and invigorating climate, New Mexico has become a popular health resort, especially for those suffering from lung troubles.

Agriculture. The agriculture of the state is chiefly confined to the river valleys and irrigated sections. The great extent of semiarid plains covered with gama and salt grass affords abundant food for herds and flocks, and stock raising has been the most important branch of agriculture ever since the coming of the Spaniards. The raising of cattle is most important, but in the sheep industry New Mexico is fourth among the states, being surpassed only by Montana, Wyoming and Idaho. In 1916 the total value of the live stock of the state, as estimated by the United States Department of Agriculture, was approximately $80,000,000.

A little over one-seventh of the area of the state is in farms. Hay is the most important crop, followed by corn, wheat, oats, apples and potatoes. Kafir corn and maize, beans and other vegetables are grown, and a small amount of sorghum and sugar cane is cultivated. Taos Valley produces exceptionally fine wheat. In a large part of the irrigated land excellent fruit is grown; fine peaches, plums, apricots, pears and cherries are raised in the north and apples and quinces are cultivated extensively in the central districts. Grapes are grown throughout the state, and a few oranges and figs in some parts of the south. Berries of all sorts are also successfully raised, the strawberry being the most important.

The forests of the northwestern mountains produce most of the timber, which is principally pine. Groves of cedar, juniper and piñon cover the foothills, and cottonwoods, willows and box elders cling to the lowland streams. The cactus and the yucca, the roots of which are used as a substitute for soap, are abundant in the arid, southern valleys, and the former has been chosen as the state flower. In 1915 agricultural, viticultural (vine culture) and horticultural societies were established.

Irrigation. About two-fifths of the farms of the state are irrigated, the total acreage of artificially-watered lands, including projects under construction, being 1,102,291 acres. In 1915 the Hondo Reclamation Project was completed by the government, which is also constructing the Carlsbad and Rio Grande systems. The government has made a net investment of over $3,000,000 in the irrigating systems of New Mexico.

Mining. The mountains of New Mexico are rich in minerals, and since the earliest settlement of the territory, mining has been of chief importance. Coal deposits are widely distributed throughout the state, though Raton Field in Colfax County produces the greater part of the output. The fields of Santa Fe County and the adjoining deposits in Colorado are the only ones in the United States outside of Pennsylvania that produce anthracite, but their

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combined output is less than 100,000 tons a year. Previous to 1912, coal was the chief mineral product of the state, but in that year great copper mines were opened in the Santa Rita district, and the value of the copper product, amounting to $9,000,000 a year, has since exceeded the value of the output of coal. Gold, silver and zinc are other important minerals, and lead, gypsum, iron ore, mica, clay, meerschaum, sand, gravel, salt, mineral waters, turquoise and other precious stones are produced. The value of the state's mineral products is about $18,000,000.

Manufactures. The manufacturing industries of New Mexico have not been extensively developed but they have increased in number and importance since 1890. With the exception of Wyoming, New Mexico is the least important manufacturing state in the Union. Car repairing and the lumber and timber and coke industries are most important. The extensive raising of sheep has developed large wool-scouring plants. Printing and publishing, flour and grist-milling and the manufacture of brick, tile and beet sugar are among the other chief industries of the state.

Transportation. New Mexico is crossed by the trunk lines of several of the country's most important transcontinental railroads. The Atchison, Topeka & Santa Fe traverses the state from Colorado to Arizona. It has a branch following the valley of the Rio Grande southward and lines extending east and south to Texas and the Gulf of Mexico. The Southern Pacific extends through the state to the west coast. Other important lines are the Chicago, Rock Island & Pacific and the El Paso & Southwestern. Both of these latter roads have numerous spurs and crosslines, and railroad stations are reached by wagon roads from all small towns and settlements. In 1915 there were 3,031 miles of railroad and 900 miles of improved highway in the state. The "Santa Fe" owns almost half of the railway mileage.

Government and History

Government. New Mexico's first and only constitution was adopted in 1911. Amendments may be proposed in either house of the legislature, but before becoming a part of the constitution they must be accepted by a majority in both houses, and after being published for four consecutive weeks they must be adopted by the voters before the expiration of six months. Suffrage is extended to all male citizens residing in the state one year, in the county ninety days and thirty days in the precinct in which the elections are held. All candidates are nominated at primary elections, and bribery and corrupt political practices are punishable by fine or imprisonment. Women vote at school elections.

The *legislative department* consists of a senate of twenty-four members and a house of representatives of forty-nine members, meeting biennially. Senators are elected for four years and representatives have two-year terms. A modified form of referendum is in force.

The *executive department* consists of the governor, lieutenant-governor, secretary of state, auditor, treasurer, attorney-general, superintendent of public instruction and commissioner of public lands; these are all elected for terms of two years and are not eligible to any state office for two after serving two consecutive terms. Since 1915 tax commissioners have been appointed.

The *judicial department* consists of a supreme court having three justices, eight district courts, county probate courts, justices of the peace and such inferior courts as are established by law.

The usual forms of local government are cities, counties and townships. Cities may adopt the commission form of government. No saloons are allowed except within cities, towns and villages having at least 100 inhabitants.

A Spanish and a Mexican Province. New Mexico was the home of the famous Cliff Dwellers and Pueblo Indians, the most civilized and wealthy of American red men. The remains of their great prehistoric cities at Gran Quivira and El Moro and the cliff dwellings in the Mogollon Mountains are among the most notable historical antiquities preserved by the United States government. Stories of the great wealth of these Indians attracted Spanish explorers, and in 1598 Juan de Oñate conquered the Pueblos and established the first Spanish Colony. Before 1616 Santa Fe was founded. In spite of the severe attacks of the Apaches and Navahos, the white population slowly increased, many towns and missions were founded, and the mines were worked.

The territory became a province of Mexico when that country gained its independence from Spain in 1821. Early in the nineteenth century, American trade was established be-

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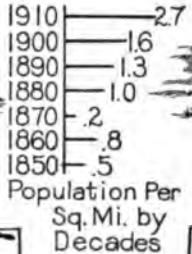
NEW MEXICO

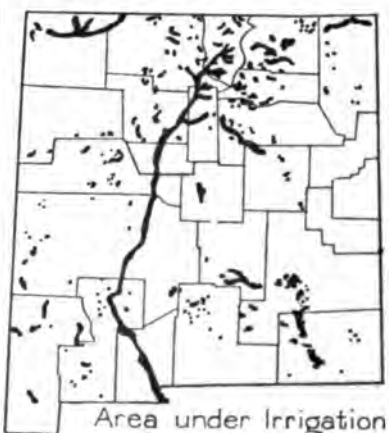
Cliff Dwellings in the Chaco Canon

Canon of the Brazos

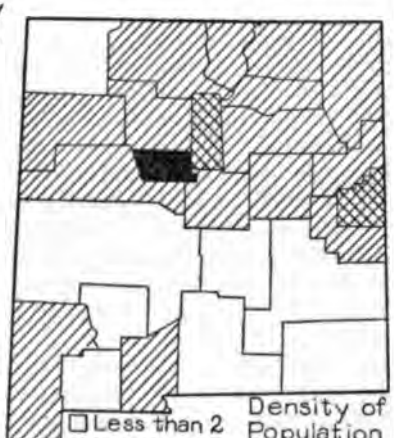
University of New Mexico at Albuquerque



Science Hall, College of Agriculture



Area under Irrigation (in black)



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tween the province and the frontier settlements, especially with Kaskaskia, Ill., and with Franklin and Independence, Mo., and the famous "Santa Fe Trail" was opened for overland trade. In 1846, during the War with Mexico, United States troops under Kearny occupied Santa Fe, and by the Treaty of Guadalupe Hidalgo, February 2, 1848, the territory was added to the United States as a part of the Mexican cession.

As Territory and State. New Mexico was organized as a territory, September 9, 1850, the boundaries including parts of the present states of Arizona and Colorado. The territory was further extended in 1853 by the addition of the Gadsden Purchase. The formation of the Territory of Arizona in 1863 and the Territory of Colorado in 1867 greatly reduced New Mexico in size. During the War of Secession, the territory was invaded and occupied for a short time by the "Texas Rangers," troops of the Confederate army.

New Mexico made several attempts to gain admission to the Union. In 1901 an act of admission passed the House but did not reach a vote in the Senate. In 1906 Congress provided for the admission of Arizona and New Mexico as one state, if approved by a majority in each territory. The Arizona electors disapproved, and New Mexico remained a territory until 1911, when it was admitted as the forty-seventh state of the Union. In 1914 three amendments were added to the state constitution, one reducing the terms of state and county officers to two years, another allowing such officers to succeed themselves, and a third repealing the clause on taxation and eliminating the state board of equalization. New Mexico's first two governors were Democrats.

During the Mexican disturbances of 1915 and 1916 frequent border raids were made by the Mexicans, and in March, 1916, several American civilians and soldiers were killed at Columbus, in a raid led by Villa himself. As a result of this massacre, General Funston of the United States army ordered a punitive expedition under General Pershing to pursue the troops of Villa. The invasion of Mexico was begun and trouble with Carranza ensued, causing strained relations between Mexico and the United States (see MEXICO, subtitle *Government and History*). In the Presidential election of 1916 the state was carried by the Democrats. E.B.P.

Consult Ladd's *The Story of New Mexico;* Bancroft's *Arizona and New Mexico.*

Research Questions on New Mexico

(An Outline suitable for New Mexico will be found with the article "State.")

What is a *mesa?*

Where and what is the Llano Estacado?

What are *bolsons,* and where are they found?

What is the loftiest point in the state? Is this higher or lower than the loftiest point in Colorado? Wyoming? Montana? Idaho? Nevada? Utah?

How many states are larger than New Mexico?

How many of the smaller states have a larger population? (See UNITED STATES.)

How many states the size of the smallest in the United States could be made from New Mexico?

How does the density of population compare with that of Arizona? With that of Nevada? With that of the country as a whole?

If the population of Philadelphia and that of New Mexico could be exchanged, how much more densely would the state be populated than it is at present?

Of what are most of the houses of the Spanish-Americans made?

Who are the *mestizos?*

How large a proportion of the population is composed of Indians?

Describe the interesting architecture of the Pueblo Indians (see PUEBLO).

What has determined the dominant religion of the state?

What accounts for the comparatively high percentage of illiteracy?

What very interesting example of protective coloration of animals is to be found in the southern part of the state?

What is the "Nile of New Mexico," and why is it so called?

About how large a proportion of the days are rainy or cloudy in New Mexico?

Why are the nights in this region so much cooler than the days?

How does it happen that so many of the rivers in this dry region maintain their flow throughout the year?

In what important branch of agriculture is New Mexico surpassed by only three states?

What is the railroad mileage to one hundred square miles of area?

How did this region come into the possession of the United States?

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Related Subjects. The reader is referred to the following articles in these volumes for additional information in connection with the study of New Mexico:

CITIES

Albuquerque	Roswell
Las Vegas	Santa Fe
Raton	

HISTORY

Apache	Mexico, subhead *History*
Cliff Dwellers	Navaho
Gadsden Purchase	Pueblo
Guadalupe Hidalgo	

LEADING PRODUCTS

Cattle	Hay
Coal	Sheep
Copper	Wool

PHYSICAL FEATURES

Gila	Rio Grande
Mesa	Rocky Mountains

NEW MEXICO, University of, located at Albuquerque, was established in 1889 by the territorial legislature as the future state university. The school, when opened in 1892, included a normal school and preparatory department. The following year a commercial school was added. Besides these departments the university now consists of a college of letters and arts, a college of science and engineering, a school of commerce, a school of music and art and a summer school. Nearly all of the university buildings are modified types of Pueblo Indian architecture, giving a pleasing and effective local touch. In connection with the university is the Hadley Climatological Laboratory, a school established to investigate the effect of high altitudes and dry climates upon disease. The University is located in a rapidly-growing, though thinly-settled, section of the state. The university instructors number about twenty-five, and the students about 250. The library contains 12,000 volumes.

NEW ORLEANS, Battle of, a battle of the War of 1812, which would never have occurred had the telegraph and submarine cable been invented before it was fought. It took place on January 8, 1815, before word was received in America of the signing of the treaty of peace at Ghent, Belgium, on December 24, 1814, and is the only battle in history which was fought after the declaration of peace. The American forces in the South, consisting of 6,000 men, were commanded by General Andrew Jackson, and upon him fell the duty of defending the city of New Orleans. The army that came directly from Europe to take the city was 12,000 strong, and made up of some of the best soldiers that had defeated Napoleon's armies. Sir Edward Pakenham, commander of the British, began an unsuccessful cannonade of the American lines on New Year's Day. A week later he ordered a general assault.

The American defenses consisted of earthworks and cotton bales, behind which men and cannon were placed, and under the deadly fire which met them the British were driven back completely disheartened. Their loss was about 2,500 men and officers, but the American loss was very small. The battle had no effect on the outcome of the war, but indirectly it was of great importance. General Jackson's military genius and his spirited defense of the city made him the idol of the people and put him before the country as a Presidential candidate, while the battle itself gave the American government prestige in Europe. See War of 1812; Jackson, Andrew.

Consult Smith's *Battle of New Orleans.*

NEW ORLEANS, *awr'le anz,* La., the largest city of the Southern states in population, and, after New York, the greatest port in the Union for foreign and domestic commerce. It is the county seat of Orleans parish, and the city and parish are coextensive; the city is on the Mississippi River, 110 miles from its entrance into the Gulf of Mexico. Mobile, Ala., is 141 miles northeast; Saint Louis, Mo., is 639 miles north, and Chicago is 923 miles northeast, by rail. The following railroads meet here: the Illinois Central; Louisville & Nash-

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ville; Texas & Pacific; Yazoo & Mississippi Valley; Queen & Crescent; Frisco Lines; New Orleans & Northeastern; New Orleans Southern and Grand Isle; New Orleans Great Northern; Louisiana Southern; Morgan's Louisiana & Texas (controlled by the Southern Pacific), and Louisiana Railway & Navigation Company.

Direct lines of steamers communicate with New York, the West Indies, Central America, Europe and the Orient. The route to the Orient was shortened about 8,500 miles by the Panama Canal. As New Orleans is a seaport, nearly all nationalities are represented among the people, with considerable French influence. The population increased from 339,075 in 1910 to 371,747 (Federal estimate) in 1916, making the city sixteenth in rank among the cities of the Union. Portions of the east bank of the river are the Fifth District and the fifteenth ward of New Orleans, and were formerly known as Algiers, though the legal title, before annexation to the city in 1870, was "Parish of Orleans, Right Bank."

Location. The city lies about ten feet below the level of the Gulf, and so far below the high-water level of the Mississippi River that levees, twenty feet high in some places, have been constructed to protect it from overflow. It occupies a strip of land between the river and Lake Pontchartrain, with which it is connected by two canals. Formerly the trend of the city followed the curve of the river, and consequently it became known as *The Crescent City,* but since the inhabited portion has been extended its shape more closely resembles the letter "S." Until recently, the problem of drainage and sewerage has been a difficult one, but by the expenditure of about $15,000,000 on the construction of pumping stations, the laying of many miles of sewer pipe, and the building of miles of canals, both of these systems have been made complete. Buildings may now be constructed with cellars, and the use of cypress piles and reënforced concrete in foundations has made the modern "skyscraper" possible for New Orleans. The waterworks plant, using water from the Mississippi River, is one of the largest of its kind in the world and one of the most efficient in the United States.

Description. New Orleans resembles a sort of pictorial book, which tells an historical story extending through many periods. There are the old Spanish and French quarters with their timeworn buildings and narrow, cobbled streets, and the busy, modern city which represents the best in architectural skill and construction. To visitors, the French Quarter, locally called *Vieux Carré,* is always interesting, though it is unsanitary and congested. Here are found nearly all of the historical buildings and landmarks—decadent old mansions with their odd latticed windows and courtyards, in a setting of semitropical vegetation; old-world antique shops, and famous old cafés, conducted by people who speak French almost exclusively. Here, too, may be seen *Old Absinthe House,* former headquarters of Jean Lafitte, the "patriot-pirate," and the *Haunted House* made famous by George W. Cable.

In strong contrast is the business section, with its modern office buildings, large department stores and handsome public buildings. This section forms the connecting link between the French Quarter and the Garden District, the latter the residential section of the wealth and the aristocracy of the Crescent City. This latter district is distinctly Southern in character; it has broad parkways and palatial homes, with wide verandas or galleries, set in bowers of luxuriant, semitropical foliage, fragrant jasmine and magnolia. Saint Charles Avenue in this locality is the chief residential boulevard. It is seven miles long and in some parts represents the highest art of the architect and the landscape gardener.

No description of New Orleans is complete without reference to its social life. The world-famous carnival, the Mardi Gras (which see); the French Grand Opera Company, an organization that was established forty years before the War of Secession; and also the horse racing, yet a most alluring sport, attracts throngs of visitors to the city during January and February. In 1917 a two-mile speedway was nearing completion, on 360 acres of land fronting on Lake Pontchartrain.

The parks of New Orleans occupy more than 700 acres; of these, Audubon Park and City Park are the largest and most interesting. Originally they were plantations; the latter was the scene of many duels and the former marked an epoch in the industrial life of the city, as here, in 1796, Etienne de Boré made the first successful attempt to granulate sugar. Jackson Square (formerly Place d'Armes) is one of the most beautiful public squares in the United States. It was the scene of the triumphal entry of General Jackson into the city after the Battle of New Orleans (which see) in 1815, and of the two transfers (in the Cabildo) of the province in 1803. Beauregard Square was the old-time resort of slaves. Other features of in-

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terest are the French Market and the cemeteries, where the curious custom prevails of burying the dead in vaults rising in tiers above ground, since water was found almost immediately below before the drainage system was installed. Canal Street, the principal business street, is noted for its unusual width (200 feet).

Buildings. Among the buildings of historic interest are the Cabildo (the Spanish house of government), the Presbytery (the house of the Capuchin priests), the Saint Louis Cathedral, established in 1724, and one of the best-known churches in the United States; the Pontalba buildings, and the convent of the Ursuline Nuns, the oldest building in the city (1730). The new marble post office, completed at a cost of $3,000,000, and the beautiful city hall face Lafayette Square. Other notable buildings are the $2,000,000 white marble courthouse, the Cotton Exchange, the new Trans-Mississippi passenger station, the Hennen, Hibernia, Liverpool, London, Globe and Morris office buildings and some fine bank buildings. There are also many fine Roman Catholic, Protestant and Jewish places of worship.

Institutions. In addition to the eighty-seven elementary schools there are eight manual training schools and three business schools. For advanced education the city has Tulane University, with the H. Sophie Newcomb Memorial College for Women, the Loyola College for boys, and four colleges for colored students. Besides the Carnegie Library, with 100,000 volumes, the city has Howard Memorial Library, the Delgado Museum of Art and the Confederate Memorial, containing historical relics. The benevolent institutions include the charity hospital, one of the best-equipped institutions of its kind in the Union; Presbyterian Hospital and Hotel Dieu (Roman Catholic hospital); the Jewish institutions for the orphaned, the aged and the infirm; Roman Catholic asylums for orphans, infants and the friendless; the city homes for the aged, the infirm and the insane, and a refuge for boys. Kingsley House is modeled after the noted Hull House of Chicago.

Commerce and Industry. New Orleans is the southernmost gateway for the commerce of the greatest agricultural valley in the world, and millions of dollars have been expended in improving the port facilities, which are owned and controlled by the people. The jetties at the mouth of the river provide a channel of about thirty feet, and the river will harbor the largest vessels. There are about six miles of steel docks, affording berth space for more than

Questions on New Orleans

(An Outline suitable for use with New Orleans will be found with the article "City.")

After what famous naturalist, a native of Louisiana, was one of the parks of New Orleans named?

What invention or discovery, of great importance industrially, took place on the site of this park?

How many cities of the Southern states have a larger population?

What distinction does the city hold commercially?

What is the *Cabildo?* What is the oldest building in the city?

Which is farther from the city, Mobile or the mouth of the Mississippi?

Which is greater, the distance from Chicago to New Orleans or the distance from Chicago to New York?

What effect did the opening of the Panama Canal have on the city?

How has the fact that New Orleans is a seaport influenced the character of its population?

What does the name of the city tell you as to the nationality of its founders?

What town is within the corporate limits of New Orleans?

What is the ratio of the inhabited area to the total area?

What social institution in Chicago furnished the model for a similar one in New Orleans?

Why has it been necessary to build levees in some places along the Mississippi?

What is the popular name of the city, and why is it no longer strictly applicable?

How do the buildings of the city tell the story of its existence?

What is the *Vieux Carré,* and what would you find of interest there?

What building here was made famous by a well-known writer?

What is the Mardi Gras, and how is it celebrated?

What park is named for a President of the United States? What incident in his life took place here?

How do the cemeteries of New Orleans differ from those of most other cities? Why?

Name six articles of which New Orleans exports more than any other city in the United States.

Which is greater, the value of the annual exports and imports of New Orleans or the cost of the Panama Canal? How much?

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fifty steamers from 400 to 500 feet in length. One of the largest floating dry docks in the world has been constructed here by the United States government. New Orleans is the largest market in the Union for cotton, sugar, molasses, coffee, rice, cigars, cigarettes, nitrate and bananas, and these products, with timber, are its leading exports. There are six immense grain elevators along the docks, and each of the staples has its special exchange. The annual value of exports and imports combined is nearly $290,000,000.

The government has recognized the strategic importance of this port by maintaining a large naval station here, and Jackson Barracks is the headquarters of the United States Coast Artillery. The Federal government also maintains here an excellent immigration station. As a manufacturing center, the city has the advantage of fine shipping facilities for raw material and for manufactured products; the Belt Railroad, owned by the city, is an important factor in its development. The leading industries are rice cleaning and sugar refining, one of the largest sugar-refining plants in the world being located here. In addition there are large establishments for roasting coffee, spice mills, plants for making bags, copper, tin, sheet-iron and machine-shop products, boats, shoes and cotton products, printing and publishing houses and distilleries. The oyster and fish industries are also important. A United States mint was established here, but there has been no coinage since 1909.

History. New Orleans is the oldest settlement on the lower Mississippi River and is the oldest city in Louisiana with the exception of Natchitoches (settled in 1714). It was founded in 1718 by Jean Baptiste de Bienville, who named it in honor of the Duke of Orleans, regent of France. In 1722 it became the capital of French territory and in 1762 France ceded all of Louisiana to Spain. During the Revolutionary period, New Orleans was the headquarters of the Spanish forces in North America. In 1788 it suffered heavy loss by fire. In 1803 Louisiana was ceded by Spain to France and by France to the United States (see LOUISIANA PURCHASE). The incorporation of the city in 1805 was followed by a large increase in American population, and great impetus to its growth was given by the arrival of the first steamboat from Pittsburgh in 1812; by 1840 the population had increased to 102,000.

New Orleans was the state capital until 1849 (when the seat of government was transferred to Baton Rouge), and again from 1868 to 1880. During the War of Secession the city suffered severely, but after the reconstruction period its progress was uninterrupted. From 1832 until 1906 New Orleans was subject to epidemics of yellow fever, but in 1878 the United States Marine Hospital Service took charge of the city and the sum of $27,000 was raised to apply a system of killing mosquitoes to stamp out the plague. Water tanks and cisterns were screened and pools and ponds were oiled. The disease was finally conquered in 1906, and the people of the city believe it will never recur again. The rat-proofing campaign of the United States health department in 1914 destroyed many old, unsightly buildings. In 1912 the city adopted the commission form of government. J.M.G.

Consult King's *New Orleans: The Place and the People;* Gayarré's *History of Louisiana.*

NEW PHILADELPHIA, *fil a del' fi a,* OHIO, the county seat of Tuscarawas County, situated in the eastern part of the state, fifty miles northwest of Wheeling and about 100 miles south and east of Cleveland. It is on the Tuscarawas River, near the Ohio Canal, and is served by the Baltimore & Ohio and the Pennsylvania railroads and by an electric interurban line. The population in 1910 was 8,542; in 1916 it was 9,912 (Federal estimate). The area of the city is nearly three square miles.

The city is in an agricultural and stock-raising country and in the vicinity are deposits of coal and iron ore and clay. The industries include mining, and the manufacture of iron and steel, woolen goods, roofing, tile and sewer pipe, pressed, stamped and enameled goods and vacuum cleaners.

New Philadelphia has Tuscora Park, containing twenty-five acres, a courthouse, public library, orphans' home, county poor farm and jail, and Union Hospital. The place was settled in 1805, incorporated as a village in 1815 and became a city in 1896.

NEWPORT, KY., the county seat of Campbell County, a residential suburb of Cincinnati, Ohio, situated in the extreme northern part of the state, at the junction of the Ohio and Licking rivers. These streams separate it from Cincinnati and from Covington, Ky., with which it is connected by bridges and an electric railroad. Newport is served by the Chesapeake & Ohio and the Louisville & Nashville railways. In 1910 the population was 30,309; by 1916 it had increased to 31,927 according to a Federal estimate.

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On the highlands, about three miles back of the city, is Fort Thomas, a United States military post. The notable buildings are the courthouse, city hall, post office, Masonic Temple and a public library. The city also has a park, and there are many handsome residences of Cincinnati business men. Although many of its people are employed in Cincinnati, its home industry is considerable, represented by factories for making watch cases, pianos and carriage supplies, printing houses and mills for making sheet-iron, rails and iron roofing.

Newport was settled in 1791, was incorporated as a town in 1795 and as a city in 1850. It is now governed on the commission plan.

NEWPORT, R. I., the county seat of Newport County, best known as an exclusive resort of the wealthy. It occupies an area of six square miles at the southwestern extremity of the island of Rhode Island, in Narragansett Bay, about thirty miles southeast of Providence, the state capital, and seventy miles southwest of Boston. Railway service is provided by the New York, New Haven & Hartford Railroad, and there is regular steamboat connection with New York, Providence and other ports. In 1910 the population was 27,149; the state census of 1915 reported 30,472.

Newport has a magnificent harbor, protected by Fort Greble and Fort Adams, which are used as a headquarters and base of the Atlantic fleet of the United States navy. On Goat Island, partly enclosing the inner harbor, is a United States torpedo station, and farther north, on Coaster Harbor Island, are a United States naval training station and a war college. Adjoining the harbor are the narrow streets and old-fashioned houses of the "Old Town," while the palatial summer residences of rich Americans are on the famous Cliff Walk, which winds along the cliffs on the east coast of the island for a distance of three miles. North of the Walk is Easton's Beach, admirable for sea bathing, and south of it is a private beach, the Bailey's. Among the interesting scenic features of the place and vicinity are Spouting Rock, Purgatory (a deep fissure in the rocks), and the picturesque Paradise and Hanging rocks.

Newport has many interesting historic associations. Its old State House, dating from 1743, was used as a hospital during the Revolutionary War, and is at present the seat of the county court. A Jewish synagogue, begun in 1762, is supposed to be the oldest Hebrew place of worship in the United States. Touro Park, along Bellevue Avenue, contains the old Stone Mill, or "Round Tower," mentioned by Longfellow in his *Skeleton in Armour*. Other interesting features are the William Ellery Channing House (1751), now used as a children's home; the Redwood Library, incorporated in 1747; Whitehall, built by Dean Berkeley in 1729 as his place of residence; Trinity Protestant Episcopal Church, dating from 1725; and the Sayer House, the headquarters of the British army in 1777.

Newer buildings include the Casino, a magnificent country club, a Federal building, erected in 1916; Y. M. C. A. and Y. W. C. A. buildings, the Newport Hospital, Saint George's School for Boys and the Townsend Industrial School. The Newport Historical Society has a valuable collection of relics and there are several libraries, public fountains, monuments, statues and parks. The city has considerable coastwise trade in fish, coal and general merchandise. Newport was founded in 1639; in 1784 it became a city but surrendered its charter in 1787. It was rechartered in 1853 and again in 1906. Until 1900 it was one of the capitals of Rhode Island. A.B.C.

NEWPORT NEWS, VA., famous for its shipbuilding industry, its shipyards being among the largest in the world. It is situated in Warwick County, on the north shore of the estuary of the James River, where it meets Hampton Roads. By water Old Point Comfort is nine miles north, and Norfolk fifteen miles southeast; Richmond is seventy-five miles northwest, by rail, and Washington, D. C., is 100 miles north and west, by water. The city is the terminus of the Chesapeake & Ohio Railway Company, and is one of the largest single railway terminals in the United States. Electric lines connect with Norfolk, Old Point Comfort, Hampton and Portsmouth. Newport News is one of the principal ports of the Southern states and has direct steamship connection with several home and European ports. In 1916 the population was 20,562 (Federal estimate), an increase of 353 since 1910. The area of the city is nearly two square miles.

The fine harbor and exceptional shipping facilities of Newport News have in recent years made it the center of an extensive commerce; the value of the foreign trade in merchandise for a single year sometimes exceeds $72,000,000. The city ranks fourth in the United States in the shipment of grain. In its vast shipyards were built several United States battleships, many gunboats, cruisers, submarine and other seagoing craft; the Newport News Shipbuild-

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ing and Dry Docks Company employs about 8,000 men. Three dry docks and the coal wharves are the most important industrial features, and there are in addition two grain elevators with a capacity of nearly 3,000,000 bushels, lumber mills, knitting mills and ironworks.

Newport News has a Federal building, a library and an aviation testing plant and training school. Features of interest in the city and vicinity are Casino Park, a popular resort; Warwick Park; Fort Monroe, a national cemetery, and Buckroe Beach, on which is located a national soldiers' home. In Hampton Roads, off Newport News, the United States fleet is frequently anchored, and there, in 1862, was fought the memorable battle between the *Monitor* and the *Merrimac*.

The first settlement at Newport News was made in 1621, but the city really has been built since 1882. In 1896 it was incorporated, and its name unites those of Christopher Newport, and English sea captain, and Sir William Newce, prominent in colonial days. J.B.L.

NEW RED SANDSTONE, the name of a rock formation of the Carboniferous Period. The rocks are loams, shales and sandstones, all of which are usually of a reddish-brown color. The system was given the name to distinguish it from the *Old Red Sandstone* of Europe. Some light red sandstones occur in Oklahoma, and beds of gypsum in various localities were formed at the same time. The system extends into the Triassic Period. The formations are more numerous in Europe than in America.

Related Subjects. The reader is referred to the following articles in these volumes:

Carboniferous Period	Old Red Sandstone
Geology (diagram)	Triassic System

NEW ROCHELLE, *ro shel'*, N. Y., in Westchester County, is a residential suburb northeast of New York City, sixteen and one-half miles from the Grand Central Station. It is on Long Island Sound and is served by regular steamers and by the New York, New Haven & Hartford and the New York, Westchester & Boston railroads. Electric lines connect with near-by towns, resorts and beaches. The population, which in 1910 was 28,867, was 37,759 (Federal estimate) in 1916. The area of the city is ten square miles.

New Rochelle has an excellent harbor and is one of the leading yachting centers on Long Island Sound. Prominent clubs include the New York Athletic, on Traverse Island; the New Rochelle Yacht, on Harrison Island; the Huguenot Yacht, the Rowing and the Wykagayle Golf. In the city are a number of fine colonial residences dating from the Dutch and English periods, a Federal building, courthouse, Carnegie Library, hospital, several noteworthy churches and a memorial home for the aged. City, Hudson and Neptune parks are attractive pleasure grounds. The New Rochelle College (Roman Catholic) occupies Leland Castle, a building noted for its fine interior decorations.

The principal industrial establishments include manufactories of druggists' scales, a large printing and publishing plant and a film corporation. Huguenot refugees from La Rochelle, France, settled here in 1868, and the settlement was named for their home city. The place was incorporated in 1847 and became a city in 1899. W.R.

NEW SIBERIA ISLANDS, a group of uninhabited islands in the Arctic Ocean, lying off the north coast of Siberia. They are interesting chiefly for their great deposits of the fossil remains of the mammoth (which see) and other animals, and of certain forms of vegetation. The islands are almost treeless, but they produce a typical Arctic plant life, which provides food for great numbers of lemmings and reindeer; bears and polar foxes, which feed on the lemmings, are also found. The group has long been a popular field for hunters. The principal islands of the New Siberia archipelago are Kotelnoi, New Siberia and Liakhov. The first named is the largest, 116 miles long and 100 miles wide, and contains the highest elevations.

NEW SOUTH WALES, the most populous state in the Australian Commonwealth and Great Britain's first colony on the island continent. Lying on the southeast coast, between Queensland and Victoria, it occupies a rectangular area of 310,372 square miles. It is more than twice the size of the state of California and larger than the combined areas of Alberta, Nova Scotia and New Brunswick.

The People. In its vast extent there are over 1,784,500 inhabitants, including about 7,000 full-blooded aboriginals, of whom 2,000 are wholly or semicivilized. Over one-third of the entire population live in Sydney, the capital, which is a great modern city of about 725,400 inhabitants, resembling in its busy activities the commercial cities of America or Europe. Newcastle is the chief port for the northern part of the state; this city and its suburbs have a combined population of 57,650. Other important centers of trade are Balmain and Broken Hill, each having over 30,000 inhabitants; Newtown, Marrickville, Redfern, Paddington, Leichart

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and Glebe, each having a population of over 10,000.

Among the religious bodies, the Episcopalians, or Anglicans, are most numerous. Other prominent denominations are the Roman Catholics, Presbyterians, Methodists, Congregationalists and Baptists. Many of the Asiatic inhabitants and aboriginals have been converted to Christianity, but the non-Christians, many of whom are Jews, number about 12,000.

Free education is provided for all from the kindergarten to the university, and school attendance is compulsory for all between the ages of six and fourteen years. The percentage of illiteracy is low. At the head of the educational system is the University of Sydney, with which a college for women is affiliated. There are also a technical college, Roman Catholic, Anglican and Presbyterian colleges and many private schools of various grades.

The Land. The rugged and broken coast rises precipitously from the sea and its rocky headlands shelter many good harbors, including Port Jackson, on which Sydney is located; Port Stephens and Port Hunter (on which Newcastle is located); Sussex Haven and Twofold, Jervis, Botany and Broken bays. A narrow strip of fertile land lies between the sea cliffs and the rough slopes of the Great Dividing Range, which extends across the state from north to south, nearly parallel to the coast. This irregular mountain system is broken into three minor ranges, that in the north being known as the New England Mountains, the central range being called the Blue Mountains and the Australian Alps forming the southern part of the system. These highlands, especially in the central region, are scarred by deep canyons and ravines, and their rugged peaks are separated by gorgelike valleys. The loftiest elevation in the state, Mount Kosciusko, lifts its snow-capped peak 7,350 feet above the sea. The western slopes of these ranges broaden into a rolling plateau which merges into the great arid grass-covered plains occupying the western part of the state.

The chief rivers are the Murray, which forms the greater part of the southern boundary; its tributaries, the Lachlan and the Darling; and the Murrumbidgee, an affluent of the latter. There are many other streams in the western plains, but most of them evaporate during the dry season. The eastern mountain slopes are the source of numerous small rivers and streams, many of which empty into large lagoons shut off from the sea by sand bars.

The climate of New South Wales is generally healthful, but the state, extending through many degrees of latitude and possessing a varied elevation, has climates ranging from that of the Northern United States to that of Central America, and from the dry heat of the western plains to the coolness of the damp coast regions. The temperature at Sydney is moderate and annually averages 63° F., but in the interior extremes of both cold and heat are known. The rainfall ranges from fifty inches on the coast to ten inches in the western plains.

LOCATION MAP
Position of New South Wales in Australia, and its size compared with the entire Commonwealth.

Industries. Grazing, the first industry of the colony, is still the chief source of wealth of New South Wales. The scarcity of water renders the western and larger part of the state unsuitable for agriculture, but the extensive grass-covered plains of this section afford excellent pasturage for sheep, cattle and horses. More sheep are raised in this state than in any other in the Commonwealth, which is the greatest wool-producing country in the world, and about one-half of Australia's total output of wool is produced by New South Wales.

The cultivated area is chiefly confined to the coast region and table-lands, but with the increasing use of irrigation it is being extended in the west, where the soil is productive when artificially watered. Over one-half of the tilled lands are devoted to wheat; hay, corn, green forage, oats, potatoes, tobacco and fruit, chiefly oranges, lemons and grapes, are other important crops.

The state is rich in mineral resources and the mining industry follows grazing in importance. The coal fields cover over 10,000 acres and annually produce more than 8,000,000 tons, sometimes over 10,000,000. The first gold produced in Australia was mined in New South Wales, where it was long the chief mineral product. Its production has declined in recent years and has been surpassed by the output of silver. Zinc is mined extensively in the silver district and copper of the richest quality, tin and iron are found in abundance. Lead, platinum and opals are other mineral products.

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There has been a steady growth in the manufacturing interests, which are closely associated with the stock-raising and mining industries; the principal establishments include tanneries, woolen factories, soap and tallow works, foundries, machine shops and clothing factories.

Communication and Trade. The transportation in the more settled sections is good, and there are many miles of improved roads affording communication with the railroads throughout the state. Most of the railroad mileage, which amounts to over 4,000, and over 200 miles of electric car line are owned by the government.

Sydney is an important commercial port, exporting large quantities of wool, gold bullion, hides, skins, meats, wheat, coal and copper.

Government and History. The executive power is vested in a governor appointed by the Crown, and a responsible ministry. The law-making body is a parliament consisting of a legislative council of not less than twenty-one members appointed for life by the Crown, and a legislative assembly composed of ninety members elected by universal suffrage. Women have the same suffrage rights as men, and have voted since 1902.

New South Wales was discovered and named in 1770 by Captain Cook. The first settlement in Australia was the penal colony established at Botany Bay in 1788. Convict immigration ceased in 1840, and three years later representative government was established. The rather vague limits of the colony were changed with the erection of Victoria as a separate colony in 1850 and the separation of Queensland in 1859. The discovery of gold in 1851 caused a rapid growth in population and prosperity. In 1901 the colony was incorporated as one of the six original states in the Australian Commonwealth. See AUSTRALIA. G.G.

Consult Mills' *The Colonization of Australia;* Fitchett's *Australia in the Making.*

Related Subjects. The following articles in these volumes will be of interest in connection with a study of New South Wales:

CITIES

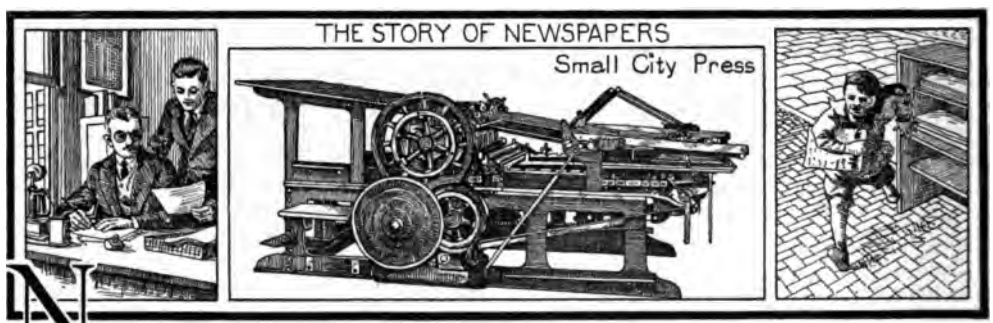
Newcastle	Sydney

LEADING PRODUCTS

Cattle	Silver
Coal	Wheat
Horse	Wool
Sheep	Zinc

RIVERS

Lachlan	Murrumbidgee
Murray	



NEWSPAPER, a periodical publication devoted to the circulation of news. The name is now generally applied only to those periodicals which appear daily, or, at the most, weekly. Many weekly periodicals, however, are grouped with those which are issued at longer intervals as magazines.

The modern newspaper is a powerful molder of public opinion, and in many ways the man who controls its policy takes the place of the orator of former times. Editors like John Delane of the London *Times,* Horace Greeley of the New York *Tribune,* Charles A. Dana of the New York *Sun,* to name only three outstanding men, exercised an influence which was scarcely second to that of the greatest statesmen of their day. Through the newspaper the editor reaches thousands of people who would be beyond reach of his voice.

As a molder of public opinion the modern newspaper deals with every subject from the best way to make bread to the proper way to run the business of a nation. The newspaper has a vast influence on public opinion as regards politics, religion and dozens of other problems. Every newspaper, too, has the opportunity to make itself a force for social betterment, for moral uplift, in its community. It need not thereby make itself the organ of a single movement; it can support the cause of

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also has a number of lumber mills, one of which, with a daily capacity of 400,000 board feet, is said to be the largest in the Dominion. Other large industrial establishments are saw and shingle mills, box factories, machine shops, car shops, creameries, a fruit cannery, shipbuilding yards and munitions factories.

Conspicuous features of the city are the public hospital, erected at a cost of $200,000; the high school, the Carnegie Public Library and the Westminster Trust block. As the capital of the electoral district of the same name, it has the government buildings, including the courthouse and the Indian and fisheries office. A penitentiary and provincial asylum for the insane are also located in the city.

New Westminster was founded in 1859, and until 1866, when the colony of Vancouver Island was joined to British Columbia, it was the capital of the colony on the mainland. It was named by Queen Victoria in honor of the ancient city of Westminster, now considered a part of London. Thus it doubly deserves the popular name, the *Royal City,* which is given to it. It was incorporated as a city in 1872, and remained the largest settlement on the mainland of British Columbia until the rapid growth of Vancouver, founded in 1885, deprived it of this honor. In 1898 New Westminster suffered from a fire which destroyed the business district. W.B.

NEW YEAR, the first day of the calendar year, celebrated in all civilized countries by religious observances, often preceded or followed by festivities. The custom widely prevailed even among the earliest of the ancient nations. The Chinese, the Egyptians, the Jews, the Romans and the Mohammedans, though observing different days as the commencement of the year, all marked them with elaborate ceremonies. In ancient Rome, where the year began in March, the day was sacred to Janus, whose two faces were typical of the attitude of the people toward a day which gave cause for reflection on the past and thought for the future. Presents were exchanged, and during the Empire the custom of giving to the emperor became so general that the entire populace brought presents and wished him good fortune. The former simple branches of bay and palm gave way to elaborate and costly presents.

Among the Druids, the priests cut down branches of the sacred mistletoe on New Year's Day, March 10 in their calendar. After this ceremony they feasted and offered sacrifices. The Christian Church from the beginning has observed the first day of the year. The early fathers forbade any festivities, because of their pagan associations, but these prohibitions were eventually ignored. Christmas Day, Easter Day, March 1 and March 25, the Feast of Annunciation, have all been celebrated at various times and in various countries as the opening of the new year, and it is only since the sixteenth century, when the Gregorian Calendar was adopted, that January 1 has become generally recognized as New Year's Day. In Russia, Greece, and the other countries which retain the Julian Calendar, New Year's Day is twelve days later, on January 13. In many countries, especially in Scotland and Germany, New Year's Day is the occasion of visits, congratulations and wishes for future success and happiness.

Formerly in the United States New Year's Day was a day set apart for formal calls, but the custom has declined greatly. New Year's Day is a legal holiday by statute except in Arkansas and Massachusetts; it is also a statutory legal holiday in all the provinces of Canada. In Europe, as in America, places of business are generally closed on this day. New Year's Eve, or Saint Sylvester's Eve, is often celebrated with gayety of all kinds. In the Roman Catholic Church, the *Te Deum* is frequently sung as the old year draws to a close, and January 1 is the feast of the Circumcision, a day of obligation. W.F.Z.

End of Volume Five

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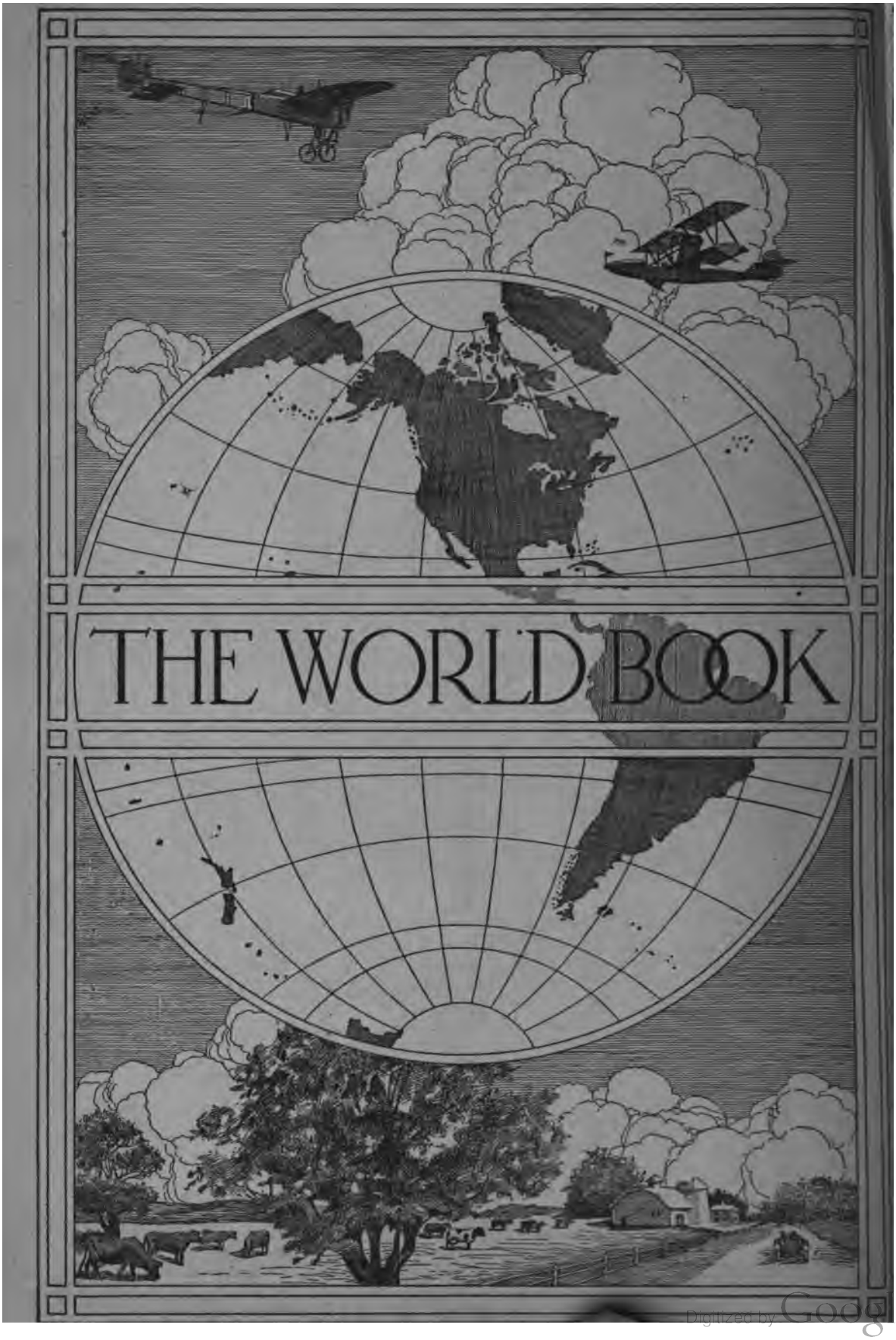

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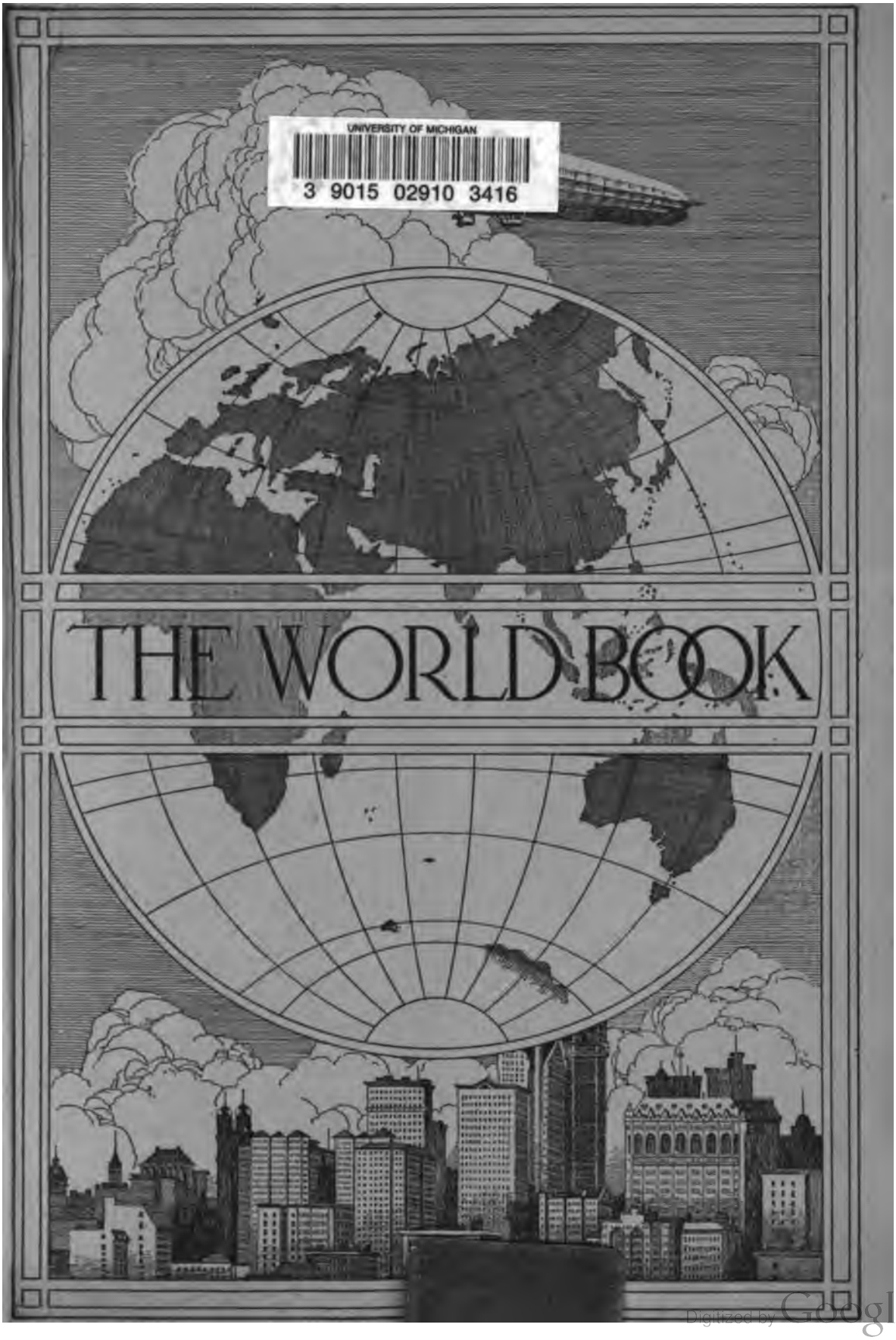

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